

CIO

A stylized illustration of a man in a dark suit and light blue shirt, shouting with his mouth wide open. He is holding a large bundle of black network cables with multiple white wires exposed at the ends. The background is a dark, textured brown.

BUSINESS TECHNOLOGY LEADERSHIP

CHINA BUILDS A BETTER INTERNET

IT'S BIGGER, FASTER, MORE SECURE
...AND YOU'RE NOT ON IT

BY BEN WORTHEN
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2006

CIO GLOBAL OUTSOURCING GUIDE

- Infrastructure
- Risks
- Rewards
- Costs
- Skills

...And more

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OPEN SOURCE

How one
mid-market
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[I.T. VALUE]

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[PODCAST]

The Past, Present & Future of SOA

A discussion between Verizon CIO Shaygan Kheradpir and CIO Executive Editor Christopher Koch. » www.cio.com/podcasts/authors.html

[BLOGS & COLUMNS]

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A report from employment services company Manpower examines the IT labor shortage paradox. Plus, a podcast with Manpower CEO Jeff Joerres.

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Are You a Dinosaur?

Enterprise innovation increasingly is being driven by online consumer technology. CIOs who don't pay attention to what's going on out there could be facing their own extinction.

A few issues ago, I wrote a column titled "The Next Wave Is Here" (www.cio.com/031506) about the profound changes taking place at the heart of enterprise IT. Well, if those internal changes are profound, the ones taking place at the edge are revolutionary. And they're also what's driving the need for internal IT transformation.

If you've been reading my column for any period of time, you know I'm not prone to hyperbole. All through the (first) dotcom era, *CIO's* take on newly emerging Web businesses was pretty conservative. One piece we wrote, about whether CIOs should ditch their jobs with traditional companies to run IT at a dotcom, was headlined "Look Before You Leap" (www.cio.com/110101) and provided a rational framework for making that decision amid all the irrational turn-of-the-century exuberance. (As it turned out, we were probably *too* conservative on that one.

While few of those jobs had good long-term prospects, it's hard to argue now with the value they provided, experiencewise, as a tour of duty.)

But as rational as we are at *CIO*, we're getting pretty exuberant about what's going on today. And given the velocity at which it's all happening and the extremely conservative climate we're coming out of, some good old-fashioned hype just might be in order.

Innovation today centers on the digital consumer and is spilling over into business, said Verizon CIO Shaygan Kheradpir at last month's IDC IT Forum. There's a flood of cool, simple, creative new stuff emerging online every day. With the Internet as a platform for testing out ideas, the cycle time to determine market acceptance is insanely short. (And, by the way, your new competitors know that, even if you don't.)

So why is this a problem for CIOs? For one thing, too many of you don't spend any appreciable time online. You don't know what a vlog is, or a machinima (I didn't either before this week), and you've probably never spent time in MySpace and rarely communicate by IM. You're dinosaurs. I am too.

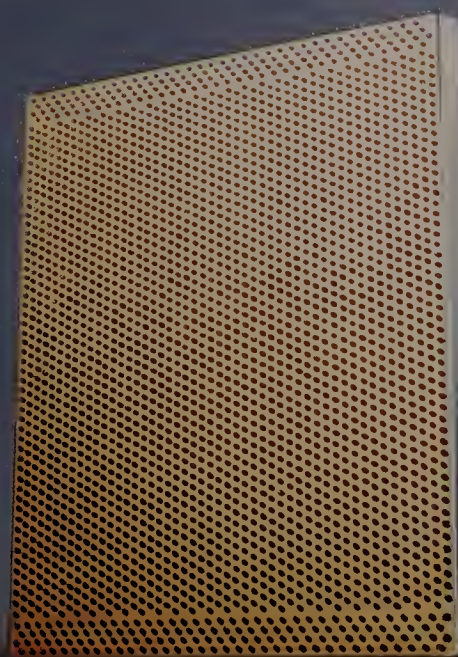
Unlike real dinosaurs, however, we have an opportunity to adapt. But we've got to get out there. Carve out a half hour a day, if possible, to visit some of the Web's more unusual neighborhoods. Spend some time in the virtual world. Find a vlog (a video blog) about something that interests you. Edit your home videos through an online service. IM not just with your kids, but with other interesting, creative people. Hire young people and encourage them to tell you about some of the cooler things that are happening, because you'll never keep up on your own.

After about a month of this, carve out some time with your colleagues to think about the 360-degree implications of these things for your business.

The biggest risk right now is not irrational exuberance but rational conservatism. And as we all know, that's something that comes naturally to CIOs.

Given the extremely conservative climate we're coming out of, some good old-fashioned hype just might be in order.

Abbie Lundberg, Editor in Chief
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Batting Practice

In business, hitting .300 doesn't get you into the Hall of Fame



In baseball, if you fail to get a hit seven out of 10 times, that's a .300 average and you're regarded as a top performer. But CIOs don't play baseball. They play the game of business, and failing seven out of 10 times is not only embarrassing, it's unacceptable.

That's why I took a hard look at some of the startling statistics that *CIO* has uncovered over the past few issues. In "When Failure Is Not an Option" (www.cio.com/060106), we cited a biennial study by the Standish Group reporting that just 29 percent of IT

projects conducted in 2004 were completed on time, on budget, and with all features and functions originally specified. In "Federal IT Flunks Out" (www.cio.com/051506), we identified a minimum of eight government projects that either have failed already or seem about to do so. And the government has already spent more than \$12 billion on these projects!

Trust me when I say that I am the *CIO*'s biggest champion and understand that it's not always (or even often) the *CIO*'s fault when projects fail or go substantially over budget. But as CIOs begin to lead growth initiatives for their businesses, it's imperative that they build trust with their CXO peers. Hitting .300 in today's business world just ain't going to cut it, and it will certainly not get you into anyone's Hall of Fame.

How can projects get so out of control? How can so many projects fail? Is it the system, the talent, the expectations? I would love to hear your thoughts because the only way that CIOs will ultimately get the respect they deserve is when they can stand tall and deliver on their promises.

Michael Friedenber, President and CEO
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P.S.: This Aug. 20-22, *CIO* will host our annual *CIO 100*, where we will celebrate 100 CIOs who have not only succeeded in meeting expectations but exceeded them, driving innovation in their respective organizations. If you have time, it would be great for you to join us, to celebrate their accomplishments and learn from their practices. For more information, go to www.cio.com/conferences. Hope to see you there!



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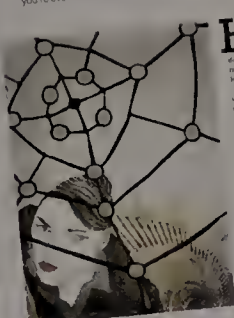
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Peer to Peer FIELD TESTED IDEAS FROM CIOs FOR CIOs

The New Glass Ceiling

As one veteran CIO discovered, finding the next opportunity is not so easy when you're over 50. BY SHELEEN QUISH



How is it possible to have been a top executive for 15 years, and for all 15 years to have been told, "You're over 50? You're not going to make it." The challenge was making sure I didn't become the statistic. The challenge was making sure I didn't become the statistic. The challenge was making sure I didn't become the statistic.

Losing My Endorsement
Fast forward to the fall of 2005. The situation had changed. The company I had been working for had been acquired and the acquisition had been completed. In addition, the company was doing well. I was a top executive. I was a top executive. I was a top executive.

Age Matters

I suffered almost the exact experience that Sheleen Quish describes in the May 15 story "The New Glass Ceiling." I was in a top technology management position for 15 years but found myself looking for a new employer at the age of 50 after my company was acquired. I had never been out of work for more than two months in the span of 30 years, so I wasn't too concerned. I spent the next two and a half years looking for work. I have a bachelor's in accounting, a master's in management information systems, and rock-solid business and technology experience. I did limited consulting to survive and tapped retirement money to keep the wolves away. Eventually I took a job with a salary I had 12 years ago, but I am happy to be able to pay my bills.

During my search, I found myself competing with huge numbers of senior IT people in the same situation. After 15 years of industry consolidation, there are just fewer places to work. But I believe the biggest reason I found it difficult to find a job is age discrimination. I would say that if you are 40 or older in an IT profession, you are at risk of losing your position. Why? First, because many companies believe that younger professionals are more up-to-date in technical

skills. And the second reason is self-insured health insurance. Self-insured companies don't want the perceived risk an older professional may bring.

The government used to protect its constituency from unfair practices but not today. I guess it costs too much.

DALE ROBERT DURBIN

When I left EDS with an early retirement package in late 1999, my next position was already secure. But when the division I was with sold two years later, I had to reenter the job market for real, this time at age 58. Knowing that my age might be a deciding factor, I approached each career opportunity on the basis of my skills and how well they applied to the role, and I did my best to take the corporate temperature to see if I would fit in. My mind-set has been that if a company does not value what I bring to the table because of my age then it's not a good place to be anyway. After several interim positions for more than four years, I am pleased to report that at the ripe young age of 63, I have a great business development role with a company that actually appreciates the gray hair and experience. So, I believe there is hope for all of us who might face age bias, provided we have the right attitude and, of course, perseverance.

PETER BENNETT

IT, aerospace and several other industries have traditionally discriminated against older workers. A friend of mine, for example, along with thousands of other workers, was laid off from a large military/aerospace contractor. All were on the verge of hitting their 20-year mark and could have applied for partial retirement. What a coincidence! Eventually he got a settlement from a class-action lawsuit, but not before losing his house and being emotionally devastated.

I currently work for a smaller company that values all employees regardless of age. In building the IT department we consciously look for a good mix of ages. The younger ones bring energy and new ideas, while older workers have experience and stability. Too bad larger companies only look at one number when hiring and firing. They are only hurting themselves.

PEDRO LOPEZ

I too took a job in 2000 with the goal of revamping the company's smaller IT shop, with great success. Yet I still seem to have "lost my endorsement." While I kept my position and title, a change in reporting effectively moved me down one level in the company. All of a sudden I am the odd man out. Not only are my opinions no longer solicited, they aren't even welcomed.

For six months now I've applied, interviewed and felt the sting of rejection. If I hear "we decided to go in a different direction" one more time I just might climb a water tower. I too am open to relocation, even at my own expense. I continue to hang in there—one has to earn after all. However, it is an uncomfortable environment at best. Perhaps the problem with those of us who are 50-plus is that our salaries are too high compared with the generation behind us. We may have the depth of experience, but we aren't the cheapest resource on the shelf. In these days of the bottom line being all that matters, are we simply no longer viable resources because of our cost?

STEVE HERBORN

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*Potential savings based on IDC White Paper, Ensuring Information Availability: Aligning Customer Needs with an Optimal Investment Strategy.

trendlines

EDITED BY ELANA VARON

NEW * HOT * UNEXPECTED

Distance Makes the Heart (and Mind) Grow Suspicious

PRIVACY When it comes to Americans' feelings about offshoring personal data, much depends on the type of information and where it's being sent, according to a recent survey by the Ponemon Institute. "Anecdotally, people seem to have pretty mixed feelings. You talk to one person and they say they hate the idea of sending their personal information offshore; another person will say it

doesn't make a difference to them at all," says Larry Ponemon, who conducted the survey of more than 1,200 Americans.

"This research is empirical validation that the public has mixed feelings."

When asked about an American company sending basic information such as name, address or phone number to another country, only 42 percent of the survey's respondents were opposed to the idea. But as the nature of the data going offshore became more sensitive, so did respondents: 64 percent did not want employee records offshored; 69 percent were opposed to credit card infor-

Continued on Page 16

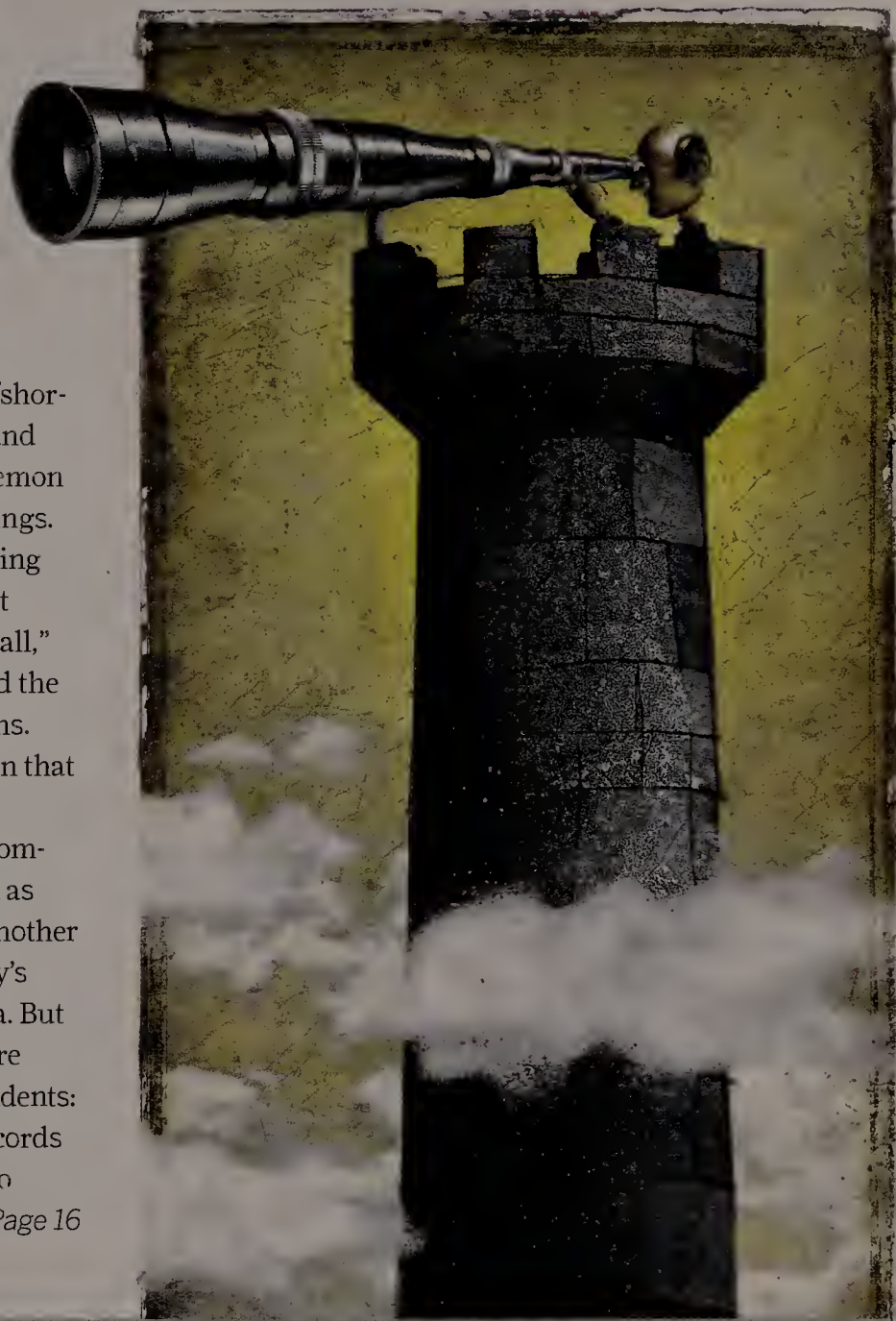
Whom Do You Trust?

Most Trusted Countries

Canada
Ireland
India
Wales
Germany

Least Trusted Countries

Philippines
Mexico
Haiti
Russia
Saudi Arabia



THE BEST WAY TO SPEND YOUR SECURITY MONEY

BUDGETS Protecting your network against spam and viruses may not be the best use of your limited security budget, according to researchers from Florida Atlantic University.

The researchers developed an economic model for how companies can evaluate their vulnerabilities, analyze their risk and calculate the potential for damage. They concluded that with limited resources,

shoring up defenses against the type of attack that is likely to cause the greatest loss may be the most prudent path. Targeted attacks have generally been shown to cause more financial damage than distributed attacks such as spam and viruses.

"This whole model is based on the principal of minimizing a security risk," says C. Derrick Huang, assistant professor at

Florida Atlantic.

Huang and professor Qing Hu were scheduled to present their case last month during the Workshop on the Economics of Information Security at the University of Cambridge in England. For a link to their paper, "Economics of Information Security Investment in the Case of Simultaneous Attacks," go to www.cio.com/071506.

—Jeremy Kirk

Philly Says Yes to Wi-Fi

UPDATE Philadelphia CIO Dianah Neff sees green lights ahead for the city's high-speed wireless project, which was approved by the city council on May 11. The citywide network, designed to cover 135 square miles, was set to begin construction in June and should finish testing in a 15-square-mile trial zone in September.

If the technology performs as promised, a full rollout will take place over the following nine to 12 months, Neff says. The result will be both a Wi-Fi infrastructure from Tropo Networks for 1Mbps residential service and a Canopy mesh network from Motorola, allowing users connectivity across a wide area.

City council approval was the last major hurdle for the controversial network. Similar projects nationwide are being fought by large cable and telecom providers (for more details, see "Wi-Fight," www.cio.com/040106).

Within five years, the city expects 20 percent of local businesses with less than 10 employees (about 2,600 companies) to subscribe to the T-1 service. The wireless project was not designed with large enterprises in mind, Neff says.

EarthLink will build and own the network, offering its own Internet access service and also selling access wholesale to other Internet service providers. The city will pay nothing and receive right-of-way fees as well as some free accounts for official use. A non-profit group, Wireless Philadelphia, will oversee EarthLink's operation of the network.

The regular price of the residential Wi-Fi service should be around \$20 per month. Meanwhile, EarthLink and the city are working to set a subsidized price for low-income residents, estimated at about \$10 a month. Prices have not yet been set for the T-1 service.

A large part of the motivation behind the project is to bring broadband to residents who can't afford it and small businesses in areas where existing high-speed services are hard to get, Neff adds.



—Stephen Lawson

Suspicious Minds

Continued from Page 15

mation leaving our shores; 74 percent were against sending banking data abroad; and a whopping 83 percent didn't want their health records leaving the country. (See "Degrees of Touchiness," this page.)

Where the information is going is as important as what it is. Canada, Ireland, India and Wales received the highest overall trust rankings out of a total of 47 countries. (For more on the pros and cons of outsourcing around the world, see "Global Outsourcing Guide 2006," Page 64.) "I was surprised about India. I expected people to say it's a developing economy and could be dangerous, especially with some publicized incidents of data exposure and theft there," says Ponemon. "Yet, we found that most people felt pretty comfortable with information being sent there. They have a track record; they're an English-speaking culture that, for the most part, seems dedicated to good security." At the bottom of the trust index were the Philippines, Mexico, Haiti and Russia. Political unrest both in the Philippines (a large call center location) and Haiti may have tarnished the image of those countries, says Ponemon. Russia's well-known high piracy rates and the recent publicity surrounding Mexico's border security may have triggered negative feelings about data traveling to those nations, Ponemon posits.

The bottom line for CIOs? Factor the cost of public concern into your ROI when making a business case for offshoring. Although only 9 percent of respondents would pay more to ensure that their personal information was not sent offshore, the

Degrees of Touchiness

As the type of personal information grows more intimate, the percentage of people who want to keep it at home rises

Basic personal information (name, address, phone number)	42%
Social Security number or driver's license number	51%
Major purchases	56%
Internet behavior	62%
Employee records	64%
Credit or debit card number	69%
Banking or home mortgage records	74%
Patient health records	83%

SOURCE: Ponemon Institute

impact of an actual security breach could be costly. "If you have a privacy meltdown, and, oh, by the way, it happened in the Philippines, watch out. It can be a pretty large cost," says Ponemon. "You'll need to do a lot more explaining up front if you choose to send data to a country that people deem dangerous. Factor trust into the equation."

—Stephanie Overby

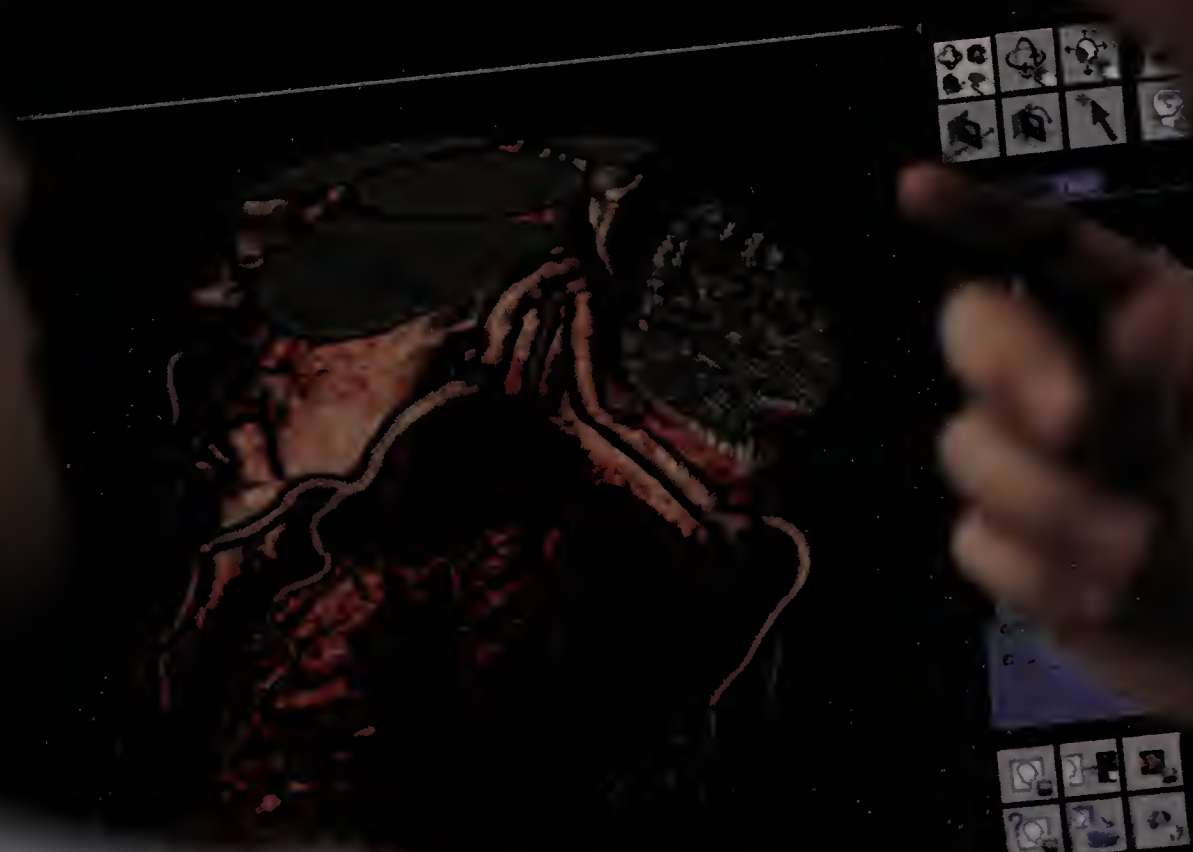
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China's Future as a Business Incubator

INNOVATION Developing a killer application takes more than just a network. You need entrepreneurs able to develop cutting-edge technologies who also possess the wherewithal and skill to take them to market.

No one doubts China's ability to do the former; that is the reason why many in the United States view China as an economic threat. But the latter will be China's greatest challenge, according to several current Chinese entrepreneurs, and why it may take a generation for China to become an innovation powerhouse.

Independent businesses are still a new concept in China, and until recently there was institutional resistance to entrepreneurial startups. Students who left school to pursue a business idea were not allowed to come back to finish their degrees if the business failed. There was scarce venture capital money to start a company, and China's business school professors had little or no real-world experience.

Kevin Hu developed software to fund his blogging and social networking site Yimudi. He is now seeking venture funding, but had to figure out for himself how to approach potential investors. "I don't really care about the finance. But now [my job] is all about cash flow and the P&L," he says.

But more support is starting to emerge. Chinese universities now encourage students to market their creations, and the government provides startups with incubator space. But because these changes are recent, there aren't many CEOs who can help an aspiring entrepreneur turn a product into a business.

The result is that the current crop of entrepreneurs will succeed or fail through trial and error. Jason Tian, CEO of Baihe, an online dating service, says today's entrepreneurs will convey the lessons they learn to the next generation. Only then will Chinese innovations become commonplace. (To learn about China's play to control the future of the Internet, turn to "China Builds a Better Internet," Page 42.)

—Ben Worthen



MADE IN CHINA

Should the Feds Say No to Lenovo?

GLOBAL MANUFACTURING First it was the Dubai Ports World deal. Now it's Chinese computers. The State Department recently decided not to use Lenovo Group computers on a classified network because of concerns about the company's ties to the Chinese government.

According to computer security experts, however, the State Department's decision shows a lack of understanding about the global nature of PC manufacturing. Most U.S. computer makers use overseas manufacturing plants, notes James Mulvenon, a Chinese computer warfare expert with the Center for Intelligence Research and Analysis. It's nearly impossible to make a computer without using foreign-made parts.

The State Department's decision comes after Rep. Frank Wolf (R-Va.) objected to the use of about 900 computers made by Lenovo on a classified network that connects American embassies and consulates. Now, the State Department says it will use Lenovo computers only in unclassified settings.

"I was deeply troubled to learn that the new computers were purchased from a China-based company," says Wolf, chairman of the House Appropriations Subcommittee on Commerce, Justice, State and the Judiciary. "This decision would have had dire consequences for our national security, potentially jeopardizing our investment in a secure IT infrastructure. It is no secret that the United States is a principal target of Chinese intelligence services." Lenovo is partly owned by the Chinese Academy of Sciences, an arm of the Chinese government, but the company's headquarters are in the United States.

It would be relatively easy for spies to get jobs with computer makers regardless of where a company is based, says Alan Paller, research director at the SANS Institute. Instead of focusing on where computers are manufactured, he says, the government should work on better security for its systems after they are purchased. "We need to do a much better job of looking for hidden back doors in systems," Paller says.

Last year, the federal government conducted a review of Lenovo's purchase of IBM's PC business and eventually approved the deal. But in April, members of the government's U.S.-China Economic and Security Review Committee raised objections to using the Lenovo computers in the classified network.

—Grant Gross



Find tools and guidance to defend your network at microsoft.com/security/IT

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How to Make a **TOUGH** Decision

LEADERSHIP Sometimes there can be more than one right answer to a problem. The option you choose can say a lot about the values of your company—and your leadership. Joseph Badaracco, the John Shad Professor of Business Ethics at Harvard Business School, offers three simple (and quick) tests to help you make a tough decision. (Download a podcast of the full interview with Badaracco at www.cio.com/podcasts/leadership.html.)

1. The newspaper test. Which plan of action for dealing with a problem is going to work best if it's going to appear on the front page of your local paper tomorrow? "That's a way of picking up on all the consequences of your act," Badaracco says.

2. The Golden Rule test. "There are a lot of different groups who believe that they have the right to have corporate officers and companies obey the law. There are the vast majority of people in most organizations who believe they have the right to be treated fairly and honestly by the people they're working for. And there are the owners of a

business who have a right to stable, growing, risk-adjusted, legal returns," Badaracco says. "The Native American advice is to walk a mile in another person's shoes. That's a way of picking up on other people's rights that you may be overlooking, because you're under pressure to get a decision done."

3. The best-friend test. "Ask yourself how you would like somebody who knows you well, and whose respect matters to you, to think about your decision," he says. "That's a way of putting a spotlight on your character [and] the character of the organization you're trying to shape." —David Rosenbaum



TRENDLINES

The Art of Competition

Getting the best of your rivals requires understanding what they're up to

BOOK REVIEW One of the biggest challenges managers face is figuring out what the competition is up to, according to Leonard Fuld, a consultant on competitive intelligence. In his new book, *The Secret Language of Competitive Intelligence*, Fuld explains how to analyze information about the competition to obtain insight and advantage over rivals.

Fuld contends that the information one needs to stay ahead of competitors is everywhere. Competitors reveal more information now than ever before, through online archives of their annual reports, press releases and PowerPoints detailing company strategy. But while the Web contains lots

of intelligence gems, it is also a source of misinformation and confusion. The key to developing insight into one's rivals is knowing how to use the data you find. Transforming information into intelligence is an art form, says Fuld, involving

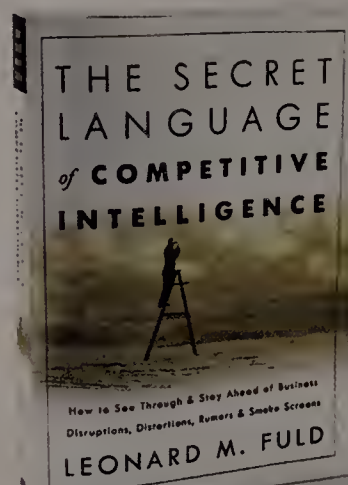
creativity, critical thinking—and prompt action once you've obtained a worthwhile insight.

One way to turn information into intelligence is by developing scenarios in which you imagine what your company might do in response to its rivals. Fuld provides examples of how companies can use competitive intelligence both offensively and defensively. Google, for example, needs to be prepared for how Microsoft might react to what

it does, because now that Google is a public company, Microsoft and other rivals have greater access to information about its intentions.

Finally, he advises, companies need to have more than one strategy for each action they anticipate rivals will take. Using competitive intelligence effectively means more than guessing what your rivals will do; it means being prepared for what they might do.

—Katherine Walsh



The Secret Language of Competitive Intelligence: How to See Through & Stay Ahead of Business Disruptions, Distortions, Rumors & Smoke Screens

By Leonard M. Fuld

Crown Business, 2006, \$24.95

IF YOUR BUSINESS INTELLIGENCE IS SO SMART



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Enterprise
Business
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by the numbers

BY DIANN DANIEL

Failing to Heed VoIP's Call

Many companies are missing voice over IP's cost savings

TRENDLINES

Slightly more than half of companies surveyed are considering, or are in the process of deploying, voice over IP (VoIP) technology, according to the Cutter Consortium, which conducted the survey of 132 organizations. But 44 percent reported that it wasn't even on their radar.

The findings are unexpected, says Lou Mazzucchelli, a fellow of the Cutter Business Technology Council. Mazzucchelli thinks many companies are being short-sighted. The major telecommunications companies are going to start offering VoIP services, and eventually, it will replace traditional phone service, he predicts.

So why are companies turning a deaf ear to VoIP? Of those who said they were not considering the technology, 53 percent cited no business need for it. Another 22 percent said they had no business sponsor for a VoIP project. There are costs to VoIP, Mazzucchelli acknowledges, but traditional telephone service isn't free either. In the long run, he notes, VoIP offers substantial cost savings over existing technology.

VoIP skeptics often cite security as a reason for avoiding the technology, but Mazzucchelli believes the lack of an adequate network infrastructure is a bigger technical barrier to adoption. Twenty-one percent of respondents said they weren't looking at VoIP because their current infrastructure would not support it.

VoIP can be unreliable (it's vulnerable to problems such as dropped calls), so IT shops need sufficient staff to keep an in-house VoIP system running. Also, traditional telephony providers supply backup

power during power outages, but VoIP users must provide their own. Mazzucchelli says the seriousness of these barriers depends on the relative importance of security and reliability to a company. For example, some parts of an organization could easily tolerate a power outage. "If you're a utility, you want your customer service line open during a disaster," Mazzucchelli observes. "But many others in the company probably have cell phones they could use." You have to ask where it's OK to take a risk on a new technology.

Best Practices:

- 1 Learn about VoIP.** Even if you're not planning to deploy VoIP soon, you should still stay up to speed on the technology and adoption trends, advises Mazzucchelli. That way, you won't fall behind as competitors deploy VoIP systems.
- 2 Evaluate the pros and cons.** The decisions of whether to use VoIP and how to use it are unique for every company. Consider the impact VoIP would have on network security and reliability, infrastructure, staffing and telecommunications costs. "VoIP is in its infancy," Mazzucchelli notes; right now, more has been written about how to deploy it than is known from experience.
- 3 Go slowly.** Don't convert your entire voice network to VoIP at once. Consider a mix of traditional voice services and VoIP to lower the risk of rolling out the new technology.

A New Technology's Adoption Curve

56%

of companies surveyed are considering or have deployed VoIP.

Stage of implementation

Vendor research	46%
Test deployment	28%
Substantial rollout	12%
Completed implementation	14%

(NOTE: Respondents could select all that applied.)

44%

of companies surveyed are not looking to implement VoIP.

Reason

53%	No business need
22%	No business sponsor
21%	Current system won't support it
17%	Other

SOURCE: Cutter Consortium

IT ALERT:

Businesses pay most for
operating and maintenance
in the data center.[†]

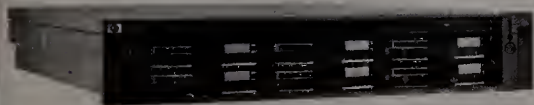
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I

T'S SAFE TO SAY that when Plato wrote in *The Republic* that necessity is the mother of invention, he had no concept of a 21st century enterprise data center. If he had, he might have mused that it's what gives birth to reinvention as well.

As IT professionals across the country and around the world strive to understand the promise and the challenges of the next generation of information technology, they recognize that nowhere is that understanding more crucial than in the core of their IT operations: the data center.

In this second edition of the Next-Gen IT series, produced jointly by the editorial teams of *CIO* and *Computerworld*, we look at the factors driving what can very aptly be described as a reinvention of the enterprise data center. Indeed, that reinvention is born of necessity: the relentless need

to drive the business by cutting costs and improving customer service.

It's clear that the reinvented, next-generation data center will be a bastion of virtualization, consolidation and automation technologies. What isn't so clear is how best to address the difficulties — and even some anomalies — inherent in their implementation. Conventional wisdom suggests that virtualization enables companies to cut staffing costs, since there's less equipment to be maintained in a virtualized environment. Yet many CIOs are finding that those costs actually increase because the environment is more complex and requires a more highly skilled staff. Consolidation by means of blade servers may cut maintenance and management expenses, but those savings can be more than offset by the cost of the energy required to cool them.

For the online edition of this publication plus relevant, related content from *CIO* and *Computerworld*, visit our Web site:

what can very aptly be described as a reinvention of the enterprise data center. Indeed, that reinvention is born of necessity: the relentless need

to drive the business by cutting costs and improving customer service.

WEBB CHAPPELL



CIO Editor in Chief **Abbie Lundberg** and *Computerworld* Editor In Chief **Don Tennant**

EDITORS' NOTE

Mother of Reinvention

We are confident that our anchor stories in this edition — “Lighting the Path to ‘Lights Out’” (page 4) and “Management: The Missing Piece of the Puzzle” (page 12) — will spark a valuable discussion of what this essential reinvention will entail. Together with the balance of the issue and additional content available on our Web site (ITNextGeneration.com), they provide an intriguing glimpse into the data center yet to be fully conceived. ♦

STRATEGY

“Lighting the Path to ‘Lights Out’”
PAGE 4

TECHNOLOGY

“Management: The Missing Piece of the Puzzle”
PAGE 12

RESEARCH

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CIO

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BY GALEN GRUMAN



HE TWIN PRESSURES

of doing more for the business and keeping IT costs down are forcing many CIOs to

rethink their approach to one of their most critical responsibilities and one of their largest costs: the enterprise data center. A joint *Computerworld/CIO* survey of 389 IT executives shows that 63% are seeking increased efficiency from their data centers, while 60% are looking to bring in new capabilities.

"CIOs are seeing that the economics of yesterday's data center isn't going to work in the future," says Michelle Bailey, research director at IDC. "You can't have more people, more I/O and more servers with

VIRTUALIZATION ON THE RISE

■ More than three quarters of all companies with 500+ employees are deploying virtual servers.

■ Respondents currently using server virtualization technologies report that they expect **45% of new servers purchased next year** to be virtualized.

SOURCE: IDC 2005 SURVEY

every new application," she says.

New technologies, such as virtualization and automation, hold significant promise in changing the economics of the data center, largely by reducing both the labor and equipment needed to be maintained and optimized. The next-generation data center, promoted by vendors as "lights out," moves away from the

maintenance-and-repair model to the orchestrate-and-prevent model. In the lights-out data center, systems largely manage themselves and a smaller core of IT staff focuses on improving the data center's ability to drive innovation and enhance the business.

But adoption of these next-generation technologies introduces architectural and integration challenges. The technologies' varying levels of maturity will require a staged implementation approach and demand that CIOs rethink their data center staffing model. "It's a lot to bite off," says Galen Schreck, a senior analyst at Forrester Research Inc.

Virtualization: Promises

One new technology in particular — virtualization — can help CIOs significantly improve operations and

Here are some strategies to reduce the technological and managerial complexities of reinventing your data center.

Lighting the Path to 'Lights Out'



flexibility in the data center. By separating software from the hardware on which it runs, virtualization can make the data center far more flexible and agile in five ways:

- It lets you treat multiple hardware devices, like servers or storage systems, as one device. Conversely, it allows you to separate individual physical servers into multiple virtual ones, making it easier to scale storage and applications up or down upon demand.

- It permits you to use cheaper, generic hardware and aggregate it into virtually unified systems that are more cost-effective.

- Virtualization makes it easier to handle equipment failure because you can move a virtual environment to other available hardware quickly.

- By treating hardware resources as one pool, virtualization lets you use that equipment more efficiently, so you need less equipment.

- Outside the production environment, virtualization makes it easier to set up, change and tear down test environments.

Clothing retailer Coldwater Creek Inc. is using virtualization to reduce its number of physical servers, leading CIO Michael Carper to predict that he will be able to "extend the life of the data center by five years."

At Corrections Corporation of America (CCA), which runs about 60 prisons, virtualization not only helps reduce hardware needs, it also speeds provisioning of new servers. "It takes just hours to bring in additional capacity, not days," says CIO Brad Wood.

Although server virtualization technology is advancing rapidly, there has been less progress on the storage side, notes Schreck. That's because traditional large-systems vendors, such as EMC Corp. and Hitachi Data Systems Corp., don't want to see storage become commoditized, says John Webster, senior analyst at Data Mobility Group LLC. But other vendors, such as Symantec Corp. and Kazeon Systems Inc., now offer software for heterogeneous environments that can virtualize generic storage systems and interact with proprietary systems.

Virtualization: Challenges

Virtualization technology is fairly new. Consequently, not all applica-



J. CRAIG SWEAT

“The skill sets change dramatically. ... We have fewer, more highly talented people.”

MICHAEL CARPER, CIO, COLDWATER CREEK INC.

tions can work in a virtualized environment, cautions Kris Dominick, president of data center consulting at Data Dimensions Inc. "You need to start with a feasibility assessment," he says. Today, virtualization also requires a restart to change the environment, so it won't work to redistribute computing and storage resources automatically on the fly.

An irony of the virtualized data center is that your staffing costs could increase even as your staffing levels decrease, says Wood. It takes more skill and experience to work in a virtualized environment than in a traditional one. As server and storage capacity is optimized, your buffer is diminished to handle fail-overs and unexpected loads. Furthermore, you have to know what resources are in use by which applications and understand which resources are now shared, since any failures or workload rebalancing can affect multiple systems simultaneously.

"You need a highly skilled, highly paid staff to manage this more complex environment," Wood says. "You can't have just the generalist anymore." The *Computerworld/CIO* survey bears this out: 44% of respondents say they expect to need a more highly skilled staff to run a virtualized data center.

The adoption of virtualization also raises political issues for CIOs. In a virtualized data center, business units may no longer have servers with their names inscribed on them. "Virtualization gets a lot of resistance [from business departments] because it's shared services. People don't play well in the sandbox together," IDC's Bailey notes. "A lot of people like to own their infrastructure."

Even within the IT department, virtualization can sometimes bruise egos, says Schreck. "Virtualization cuts across ownership boundaries," he says, leading each group to compete for resources and campaign for its own

services. A related approach to virtualization is grid computing, in which multiple servers are joined together not as a single virtual machine, but as a coordinated set of computational engines, like a yoked team of horses.

Merrill Lynch & Co. has recently deployed a grid for its derivatives business, reducing the number of servers needed to handle the same computation load. "If there's excess capacity in the grid, you can provision it in minutes," says John Cislo, director of client infrastructure solutions. It makes sense to consider a grid rather than virtualization when your computations need to use full server capacity (not share it with others) and handle lots of floating-point calculations, which are common in engineering and financial analyses, he says.

Deploying a grid raises the same political issues that virtualization raises, notes Cislo, because it, too, is a shared service. And grid computing comes with other issues. One is the need for a more homogeneous server environment, which can be hard to maintain as vendors change their hardware over time. Another is the need to deal with small, less established vendors, since the commercial versions of the technology are still new. Third, setting up a grid is expensive, so it requires that you convince management that the investment will pay off as more business units take advantage of the system, says Brad Kurtzman, director of equity-linked products, the first business group at Merrill Lynch to use grid computing.

Automation: Promises

Automation is another area where new technology can help make the data center more efficient. Imagine that each time an employee is hired, is promoted or leaves, all application and network access systems are updated to reflect changes in permissions or roles. Or that as storage is added to the data center, application and file servers, disaster recovery systems and storage management policies adjust to use the new storage capacity. Or that as application servers are added, they could simply be attached to the network, and the operating system, applications and network connections would be installed automatically.

GETTING BIGGER

During the next three years, my company plans to:



BASE: 389 IT executives

SOURCE: EXCLUSIVE COMPUTERWORLD/CIO SURVEY, CONDUCTED MAY 2006

COSTS AND CAPABILITIES

What are the three main reasons for making changes to your company's data center facilities?

To reduce operational costs through efficiency and automation

To bring in new capabilities or enlarge its mission for roughly the same overall costs

To consolidate multiple data centers for economies of scale and centralization

BASE: 389 IT executives; respondents could choose their top three

SOURCE: EXCLUSIVE COMPUTERWORLD/CIO SURVEY, CONDUCTED MAY 2006

Today, each system must be updated by an IT staffer, even if you have a centralized management console application to simplify the effort.

However, automation technology is even less mature than virtualization, reports Data Dimension's Dominick. Although many automation tools are available, they tend to focus on specific subsystems, requiring IT staffers to manage their interactions and often develop their own tools to integrate them, says Forrester's Schreck. "You need to get the integration before you can provision," he says. The result: "Maybe about 15% of North American firms have started to make this transition," Schreck notes, referring to an unpublished Forrester study. According to the *Computerworld/CIO* survey, 40% or more of respondents identified immaturity in each of four automa-

tion-related technologies as barriers to achieving a lights-out data center: policy-based, self-configuring systems for automated system adjustments; management and monitoring tools for security and compliance needs; standardized interfaces so management tools can work together; and support desk and system management tools that can work together automatically.

As automation products improve, this should change. "Today, they're mostly point tools, but I see holistic umbrella tools emerging," IDC's Bailey says. "We see the ramp-up in the next 18 to 24 months." In the meantime, enterprises should standardize their IT processes using techniques such as IT Infrastructure Library and Six Sigma to ensure that the data center has the right processes to get ready for automation, Schreck says.

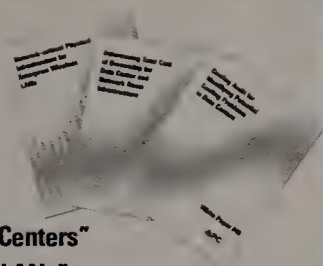
Automation: Challenges

As with virtualization, automation requires a more skilled, expensive IT staff. Troubleshooting becomes exponentially more difficult when the server that has failed is actually spread across several physical servers. And optimizing or just fixing problems in automated systems that interact with other automatic systems becomes quite difficult because so many decisions and assumptions are now hidden inside the software.

"The skill sets change dramatically," says Coldwater's Carper. He's had to change his IT staff mix by hiring more-skilled, process-oriented staffers to focus on core systems management and automation so that errors and inefficiencies don't ripple throughout the data center. He also has automated provisioning of new hardware and software wherever possible, so the IT staff doesn't spend nearly as much time loading software onto machines. For example, if a laptop needed to be replaced, Coldwater's IT staff would just drop off a new system to the user. All the user data, as well as applications and network access permissions, would be automatically restored over the network in an hour or two. That's possible because Carper invested in automated backup and provisioning systems. After revamping Coldwater's data center over the past two years, "we have fewer,

CONTINUED ON PAGE 8

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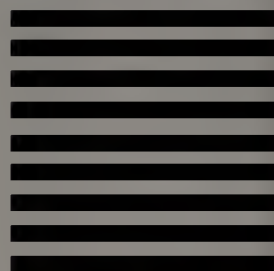
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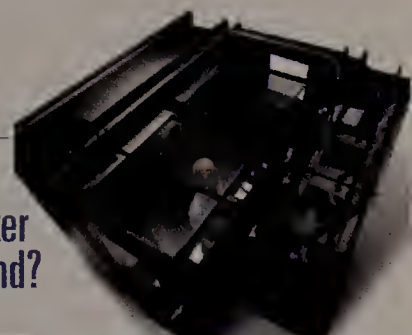


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ISXT280MD40R	40	up to 5kW	\$699,999*	\$21,999**
ISXT2800MD100R	100	up to 5kW	\$1,649,999*	\$50,999**

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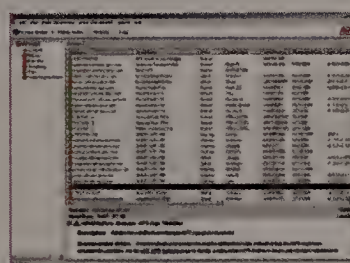
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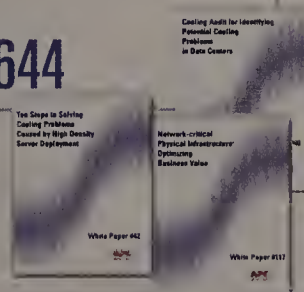
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CIOs Feel the Heat

The next-generation data center shares two problems with its elders: It's hungry, and it runs hot.

From the mainframe on, data center managers have struggled with power and heat. Huge quantities of equipment require huge amounts of power. And computers generate significant heat, which increases as equipment gets smaller and denser. And that means more air conditioning and even more power.

Whether an enterprise is trying to free up real estate or trying to cram more equipment into a growing company's existing data center, the result is the same: more power needed, more heat generated.

There aren't many easy answers to these challenges. You can replace older equipment with higher-capacity, higher-performance equipment to at least stem the tide of power usage and heat emission. You can place equipment so that the devices that emit lots of heat have greater airflow or zoned air conditioning around them. Or you could alternate high-heat devices with low-heat ones, a strategy called "hot aisle/cold aisle."

New 30-plus blade servers generate so much heat that they are especially difficult to cool, says John Webster, senior analyst at consultancy Data Mobility Group.

Pegasus Solutions CIO Mike Kistner had to use the hot aisle/cold aisle approach with his blade servers. Where possible, he's shifting to compute appliances, a type of multiprocessor device from Azul Systems Inc. that emits much less heat and takes less power. "We save thousands of dollars a month in electricity," Kistner says. But the compute appliance is designed for Java applications, so blade servers are still needed for the majority of Pegasus' enterprise software.

Corrections Corporation of America CIO Brad Wood built a new data center three years ago, with one goal being to avoid heat problems through physical design. "But we still have hot spots," he says. "The new boxes are killers for heat."

In a return to the mainframe past, data centers may need to use water cooling for the new generations of dense, rack-mounted servers and storage systems, says Randy Mott, CIO of data center equipment vendor Hewlett-Packard Co. But that presents another problem: "Lots of people don't have the plumbing in their data center," says IDC analyst Michelle Bailey. "And they are often concerned with leaks destroying the equipment." So CIOs and CTOs will have to keep their cool as best they can.

- GALEN GRUMAN

CONTINUED FROM PAGE 6

more highly talented people," he says. But the next-generation data center's demand for a more highly skilled IT workforce presents a staffing risk for CIOs moving in that direction.

Consolidation

The third leg of a next-generation data center technology strategy is consolidation. Multiple data centers can eliminate redundancies in equipment, staff and telecommunications technology. Consolidation within a single data center — reducing the range of equipment used and using higher-capacity equipment — achieves similar results by simplifying technology deployments and process changes.

Incremental technology advances, such as the use of blade servers, denser storage and multiprocessor CPUs, have made it easier to consolidate data centers by increasing capacity in the same or less physical space. "We get economies of scale, with no additional management needed," says Mike Kistner, CIO of Pegasus Solutions Inc., a payments and reservations service provider for hotels.

The maturation of remote monitor-

ing and management tools lets central IT staff manage satellite offices confidently, notes Data Dimension's Dominick. "But be careful not to get too much physical distance between the data center and the remote staff," he warns. For example, if a remote office has its own disaster recovery application running on a local server, you'll need to dispatch someone to fix it if it fails. Remote tools can handle standard processes and technologies, but specialty equipment and software will usually require someone at the scene.

"It's expensive to consolidate, so you need executive buy-in," CCA's Wood cautions.

Lights Out: The Vision

Although vendors like to use the phrase "lights out" to describe the vision of future data centers, a fully automated, self-adjusting data center with no people (à la the HAL 9000 of 2001: A Space Odyssey) remains more

As data center technologies shift and as IT becomes more tightly linked with the business, **skill sets in the data center will also evolve.** IDC believes that automation will moderate the number of systems administrators required, while **business analysts will play an increasingly important role.**

fiction than science.

What will happen is that data centers will become increasingly automated and self-managing as virtualization, automation and monitoring technologies mature, letting computers respond to typical situations based on human-created scenarios. But people will still be needed to handle the unexpected and develop the improved processes

and business applications that will keep the enterprise moving forward.

"There's no standard framework" for a next-generation data center, says Dominick. So the CIO still needs to figure out how to implement still-evolving technologies, rework and streamline the IT processes, and get the right skill mix in the organization to get closer to that lights-out vision. ♦

Gruman is principal of The Zango Group in San Francisco and a regular contributor to CIO magazine. Contact him at ggruman@zangogroup.com.

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SOE is largely about how the business organizes itself around the use of technology. Above all, SOE focuses on the business imperative and offers opportunities to approach business issues in a different way.

No More "Business as Usual"

To create SOE road maps that promise an end to "business as usual," Intel, the worldwide leader in silicon innovation, is working together with Capgemini, recognized for its thought leadership in service orientation.

In fact, Intel and Capgemini have found that organizations that successfully embrace change have learned a number of key lessons:

- **Valuable Services Must Cross Firewalls:** Don't keep services hidden internally. Put them in the hands of others in your enterprise.
- **Empower the Edge:** Provide services and tools to

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Register for your advance discounted copy of the upcoming book on SOE, *The End of Business as Usual*, co-authored by Capgemini's Andy Mulholland, Intel's Chris Thomas, and KurMeta's Paul Kurchina. Go to www.nextgenerationinsights.com and sign up today.

allow those close to customers and markets to innovate.

• **Innovate, Capture Value, Then**

Integrate: Don't wait for end-to-end service enablement; do business now and improve infrastructure gradually.

• **Practice Safe SOA:** With service-oriented architecture (SOA), establish standards for security and operational quality, while still empowering innovation at the edges.

• **Dump HTML:** Use the web as a gateway to allow customers to find you. Then bring them into a better user interface to transact business.

• **Computers Serve Humans:** Optimize in every way possible to increase human efficiency.

Built-in Capabilities

Success in applying these SOE lessons comes in part from building solutions on the right foundation. Just as SOA represents a new generation of software, Intel brings a whole crop of next-generation computing platforms to market that can amplify its advantages. This includes new mobile clients based on Intel® Centrino® Duo mobile technology. Notebooks and tablets based on this highly capable wireless computing platform can "empower the edge," where employees interact with customers.

Similarly, business desktop PCs with new Intel® vPro™ technology can provide lower TCO through built-in manageability and greater protection for business-critical data. Industry-standard servers based on the next-generation 64-bit Intel® Xeon® and Itanium® 2 processors provide the same high performance and scalability as client platforms from Intel—and they can scale dynamically.

"New Intel® platforms deploying with enhanced manageability and hardware-based virtualization features

provide the ideal foundation for a Service Oriented Infrastructure on which to deploy SOA solutions," says Chris Thomas, Chief Strategist, Intel Corporation.

Today, with industry analysts predicting service-oriented spending of more than \$33 billion annually by

"New Intel® platforms deliver enhanced manageability and hardware-based virtualization features that provide an ideal foundation for a Service Oriented Infrastructure on which to deploy SOA solutions."

**—Chris S. Thomas,
Chief Strategist, Intel
Corporation**

2010, it's clear that global organizations are focusing on new business strategies. The focus on SOE that Intel and Capgemini share is about building those new business strategies wisely, with an infrastructure that doesn't just fix

the past but instead enables the future.

As Forrester puts it, "Capgemini uses the concept of the service-oriented enterprise (SOE) to stress the importance of achieving the desired business goals of business change. But rather than sell this as a proposition to customers, the firm prefers to tackle business issues and uses SOE and SOA frameworks and approaches

At NATO, Thought Leadership, Supported by Enterprise Architecture, Brings SOE to Life

Capgemini uses the concept of the service-oriented enterprise to connect SOA technology with desired business change – not on a theoretical level but in terms of specific, achievable action. But rather than sell this as an abstract proposition to customers, the firm prefers to tackle business issues head on.

"In order to achieve real collaboration, it is essential that people, organizations and services work together seamlessly," says Olaf Kruidhof, Senior Systems Architect, NATO C3 Agency, one of Capgemini's customers.

When Capgemini brought its SOE vision to NATO, that organization's requirement was to boost interoperability. In order to meet and manage these requirements the organization adopted a services-oriented approach that was developed using NATO's own methodologies, along with best practice from Capgemini and other sources in industry and academia. All types of services are now included, ranging from operational and business information, to user/IS and technical infrastructure.

in meeting those issues as a matter of course." *

"To become faster and more agile at responding proactively to change drivers, a business needs to have choices in how it supports the business change," says Capgemini's CTO Andy Mulholland. "This could be by outsourcing the processes, constructing a new capability internally, buying or building an application or any combination of these."

Claim the Future

Intel and Capgemini challenge business leaders and IT organizations to move beyond infrastructure concerns toward becoming a service-oriented enterprise. Learn how to take the next steps in this journey by visiting Next Generation IT Insights at www.next-generationinsights.com for valuable business and technical insights, real-world case studies, webcasts and more.

*Forrester: "Identifying Service Providers' SOA Value" by Andrew Parker, John Rymer and Caroline Hoekendijk, February 2006

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Finding tools to virtualize and consolidate your data center is easy. What's harder is finding the tools to properly manage this new virtualized world.

Management: The Missing Piece of the Puzzle



BY ROBERT L. SCHEIER

BUILDING the next-generation data center is one thing. Managing it will be another.

Much of the technology to virtualize and consolidate servers, networks and storage is here today or on the way. What will take longer, according to vendors, customers and analysts, is automating that technology to reconfigure itself so the most critical applications or database queries run the fastest. Only when that automation is possible will data centers deliver on the promise of lower-cost IT capacity that businesses can tap, like a utility, as it's needed.

IT managers face "a big spider web of understanding your transactions, and where they're running, and how they're running," says an IT manager at a national retail chain who requested anonymity. For example, "I just did a big purchase of an IBM enterprise service bus. Now, I've got to see inside this service bus, and see where the holdup is. Is it application code at the Web services level? Is it MQSeries [messaging middleware]? If you don't continually try to automate, [this work] will bury you."

Bill Randall, director of MIS infrastructure at restaurant chain Red Robin International Inc., says he hasn't yet seen an automated tool "that's going to make a better decision than some of my engineers," especially when it comes to correlating information coming from different parts of the IT infrastructure. "I'm not seeing any tools out there that are able to sift through that amount of data" and automatically determine the root cause and proper fix for a problem, Randall says.

In fact, most of what research firm Gartner Inc. calls "real-time infrastructure" products are "specific to a particular problem, such as horizontally scaling applications for a particular platform, and have limited or no visibility of the end-to-end business transactions," according to a March 2006 report. The key standards and supporting products to enable true end-to-end dynamic management are at least several years away, say cus-



“[I haven't yet seen a tool] that's going to make a better decision than some of my engineers.”

BILL RANDALL, DIRECTOR OF MIS INFRASTRUCTURE, RED ROBIN INTERNATIONAL INC.

tomers and industry observers.

The obstacles facing every customer will be unique, and so will the timetables companies follow for successfully managing the next-generation data center. Here are some of the most common challenges and how some key vendors are trying to meet them.

Beyond Cost Cutting

What's been driving the move to the next-generation data center? So far, it's mostly been cost savings. Companies still recovering from the dot-com bust are looking for ways to postpone or avoid the purchase of new servers, storage or software and minimize the size of their IT staffs.

For example, Randall says EMC Corp.'s VMware virtualization software has cut the time needed to deploy a new server at Red Robin's Greenwood Village, Colo., headquarters from three to four hours to 20 minutes. Configuresoft Inc.'s Enter-

prise Configuration Manager (ECM) is also saving him four to six person-days per quarter by automating the quarterly reports he must provide to department heads about which users have permissions for accessing or changing data in various systems.

At Polaris Industries Inc., a manufacturer of snowmobiles, all-terrain vehicles and motorcycles in Medina, Minn., capital budgets have been decreasing every year. “We can't add staff, but there's more pressure to add services,” says Dean Buker, manager of network and systems operations. By virtualizing Hewlett-Packard Co. server blades with VMware, since early 2005 Buker has slashed the number of physical servers at Polaris from 120 to 70 and reduced the annual purchases of new servers by about 70%.

The corporate investment bank at Wachovia Corp. last year began using DataSynapse Inc.'s FabricServer for its transaction-oriented applications.

Tony Bishop, senior vice president and director of product management, says FabricServer has delivered 50% better performance at an 85% cost savings. It has also allowed Wachovia to reallocate processing power among multiple data centers in multiple locations as the trading day progresses around the world.

As impressive as those numbers are, companies are demanding more than just savings. They want data centers to provide the flexibility and adaptability that will improve customer service and speed the introduction of products and services. In a May 2006 *Computerworld/CIO* survey, nearly as many IT executives cited new capabilities as the main reason to change their data centers (60%) as those who cited cost cutting (63%).

Data center managers are looking toward virtualization, consolidation and automation. Virtualization means making multiple virtual devices appear as a single logical device,

or making a single physical device function like several physical devices. Consolidation means reducing the types or amount of hardware or software in the data center to cut real estate, power, licensing or management costs. Automation means reducing the need for human intervention to manage, troubleshoot or optimize the data center.

In general, consolidation and virtualization are easiest to achieve, while automation — specifically, automated management — is toughest.

Virtualization Buffet

There are several flavors of server-level virtualization, and that market is dominated by VMware. The obvious cost benefits have resulted in the explosive growth of VMware, Microsoft's decision to include a hypervisor in its next-generation Longhorn server and the development of the open-source Xen hypervisor for Linux.

IDC analyst Stephen Elliot and other observers say that as virtualization becomes ubiquitous, what will distinguish virtualization software is its ability to provide security, management, provisioning and the recording of CPU usage. These records will allow IT to charge business units for the resources they use — and to measure the value IT delivers to the business.

Among the companies offering such services are Marathon Technologies Inc., whose software links multiple Windows servers in a virtualized, high-availability environment; Leostream Corp., whose software manages server virtualization products from VMware and Microsoft; and PlateSpin Ltd., whose PowerConvert product automatically distributes servers and data among Windows virtual servers.

In June, an upgrade to VMware's server virtualization software added new power management capabilities, a distributed file system that allows users to pool heterogeneous storage arrays into virtual volumes and a distributed resource scheduler that automatically redistributes virtual machines among the physical servers as application demands change.

PolyServe Inc. in Beaverton, Ore., performs virtualization at the file-

HINDERED BY MANAGEMENT

The lack of which technologies currently limits your ability to have a "lights out" data center?

Interface standards/systems that let various management tools work together automatically

Management and monitoring tools to identify/address security or compliance issues

Policy-based, self-configuring systems to handle routine adjustments automatically

Support desk and system management tools that work together automatically

Remote access and management tools for IT staff, to allow remote/off-site management

BASE: 389 IT executives; respondents could choose all that apply

SOURCE: EXCLUSIVE COMPUTERWORLD/CIO SURVEY, CONDUCTED MAY 2006

SERVER SQUEEZE

My company is currently involved in consolidating:

Hardware servers (through clusters, blade servers, multicore hardware)

Storage through virtualization or other consolidation

Networks (such as adding VoIP to an existing network)

Applications (attempting to reduce the number of licenses or seats)

Physical data centers

None of the above

BASE: 389 IT executives; respondents could choose all that apply.

SOURCE: EXCLUSIVE COMPUTERWORLD/CIO SURVEY, CONDUCTED MAY 2006

server level with separate file-serving and database "utilities." With PolyServe, says CEO Mike Stankey, "customers can literally drag and drop the database onto a bigger or smaller server" and build policies dictating when performance slowdowns will trigger such a move. PolyServe complements, rather than replaces, processor-level virtualization such as that provided by VMware, he says. That's because VMware and similar virtualization products don't automatically

reconfigure those applications so backup and other functions work in the virtualized environment.

Work in Progress

Storage virtualization promises savings by increasing the utilization of existing disk space and easier management of fewer disk pools, as well as business benefits through improved information sharing. However, a lack of standards and immature technology have limited its deployment. Many storage virtualization products work best or work only within arrays from a single vendor.

Virtualized servers sometimes don't work well with virtualized storage because currently, every virtual machine in a server must share the same external storage resources and a single set of addresses in a Fibre Channel storage-area network. This makes it harder for administrators to create separate zones for development, test and production virtual machines; prioritize SAN resources for mission-critical applications; and quickly move a virtual server to another physical machine in case of a hardware failure.

A new standard called N-Port ID Virtualization, or NPIV, allows a single host bus adapter (HBA) to use multiple addresses within a storage network. Now available only on IBM zSeries mainframes, HBA vendor Emulex Corp. is working to expand NPIV to other platforms.

Some virtualization is possible at the network level through products such as Cisco Systems Inc.'s Catalyst Switching Series. These products allow the partitioning of a single physical network into many virtual networks, which can be configured for the performance or security needs of specific applications or networks.

Where's the Holdup?

One of the big challenges is looking deep within complex, multitiered or service-oriented applications to see what hardware or software is causing a slowdown. CoreFirst Transaction Workload Management software from OpTier Ltd. in New York is one of the strongest players in this field, according to several customers, who declined to be identified.

Unlike other products, OpTier's

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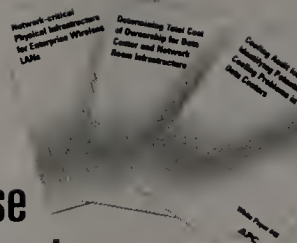
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Data Center Technologies: What's Next?

	SERVERS	NETWORKS	STORAGE
AUTOMATE	Some tasks, such as restarting failed processes, can be automated through existing management tools but might require scripting. Management vendors are still building capabilities to automate configuration and network/storage connections in virtualized environments.	Simple network management and monitoring tools are common, but managers are reluctant to give up control for higher-level changes.	It's relatively easy to automate the provisioning of volumes and logical unit numbers in a single-vendor environment, but it's much harder to do so over multi-vendor arrays. It's also difficult to accomplish across storage types (file vs. block).
VIRTUALIZE	Processor-level virtualization is becoming a commodity; growth is in tools to provide security, management and auditability for virtual server environments.	Many vendors provide virtualization at the network level (such as virtualized file systems). Virtualization of the network itself (such as virtual LANs) has been maturing for several years.	As with automation, virtualization is much easier in single-vendor environments than across arrays from multiple vendors or across network protocols.
CONSOLIDATE	Virtualization reduces costs by up to 85% by eliminating underutilized servers and trimming licensing and management costs.	Many users consolidate voice and data networks using VoIP, but virtualization is used more to tune virtual networks for specific applications than to reduce bandwidth.	Rising storage capacities make consolidation easier, but management tools are still lacking.
FUTURE TRENDS	Virtualization and consolidation will become even more common over the next 12 to 18 months as server vendors roll out more-powerful, multicore processors. Vendors will work to integrate server, network and storage management in fewer consoles. True "single-console" management across vendors isn't expected until at least 2008.	Vendors will work toward more automated and policy-based management that links network performance to business needs. Initial products are available now; increased adoption is expected over the next two to three years. Vendors will also work to integrate server, network and storage management in fewer consoles. True single-console management across vendors isn't expected until at least 2008.	Over the next two to three years, vendors are expected to introduce software with improved abilities to automatically migrate storage among tiers and manage performance to meet business service-level agreements. Increasing adoption of the SMI-S interoperability standard will slowly ease integration woes. Vendors will work to integrate server, network and storage management in fewer consoles. True single-console management across vendors isn't expected until at least 2008.

CoreFirst examines queries within databases to find those that use too many CPU cycles, too much memory or too much of the server's I/O subsystem, says the IT manager at a leading retailer. It can also prioritize workloads so that a query from a cashier looking up the price for a product, for example, gets higher priority than a query about last month's sales.

A leading health care provider in the Midwest deployed CoreFirst to troubleshoot performance problems

within a complex, fat-client customer-service application that gathers data from multiple other applications. "We can take our application and almost break it down by the business function" an employee is using, such as the time required to look up a customer record, says the company's director of technology support, who declined to be identified.

Virtualization may simplify some functions, but it complicates others, says Dennis Moreau, chief technol-

ogy officer at Configuresoft. Configuresoft's ECM, for example, can help ensure that new virtual servers meet corporate and regulatory guidelines for security and access control, are properly configured, and have the proper versions of software and the appropriate security patches. By the middle of next year, Configuresoft plans to give users the ability to check the status and configuration of instances of an operating system that exist on a server but are not yet in operation.

The more tiers developers build into their applications, and the more data sources they touch, the more flexibility managers will want in changing — on the fly and automatically — the performance of those components so they better match business needs.

David Miller, a director in the technology and infrastructure practice at systems integrator Avanade U.K. Ltd., used PolyServe to reduce the number of “passive” (or hot spare) servers for a large database deployment from 500 to 125. PolyServe also helped reduce fail-over time from five minutes to 30 seconds. The next step, he says, is for products such as PolyServe to perform such fail-over automatically as applications require it, rather than requiring an administrator to initiate the change.

Systems administrators are re-

luctant to give up a lot of control to automated tools. Randy Wood, a technical support manager in BellSouth’s Communications Systems Group in Atlanta, uses the Network Automation System from Opsware Inc., but only to view alerts from customer networks.

“It’s unlikely we would let the [software] just execute [a] change” without first contacting the customer, he says. A customer might have violated network routing policies, says Wood, but only to troubleshoot a problem — something the software would have no way of knowing.

The Value-Adds

Some companies turn to IT automation software not to manage their systems, but to monitor their compliance with regulations governing things

such as access to critical data. That’s the case at restaurant chain Red Robin, which uses Configuresoft’s ECM to ensure the proper configuration of 45 Windows servers at its headquarters. The company also uses ECM to instantly change passwords in the service accounts in its Windows Active Directory domains, a process that used to take 48 hours, says Randall.

But it will be several years at least before a single “dashboard” exists, observers say. They advise IT managers to standardize the products they buy and the way they configure them to give automated tools a chance to work. ♦

Scheier is a freelance writer in Boylston, Mass., and a frequent contributor to Computerworld. Contact him at rscheier@charter.net.

Vendors Chase Data Center Space

The next-generation data center will require specialized technologies, as well as high-level management software for a unified view.

One of the stronger companies is **Opsware Inc.**, says IDC analyst Stephen Elliot, which has “done a good job in [the] niche market” of server and network configuration and provisioning. Another firm cited by Elliot and Gartner is **OpTier Ltd.**, whose CoreFirst “autodiscovers, tracks and monitors unique transactions” and enables policies that give specific transactions more access to CPU, memory or other sources, according to a March 2006 Gartner report.

Another firm cited by both research groups is **Cassatt Corp.** Gartner says its Collage software creates virtualized hardware and software resources running on Linux, Solaris and Windows and then lets administrators scale capacity as needed. Cassatt’s focus is on scaling a specific layer of an application environment, such as the J2EE application server tier, according to Gartner, rather than on optimizing a specific function such as inventory lookups.

Splunk Inc. uses search technology to help IT managers find the causes of problems from unstructured data such as server and event logs, and integrates with CA’s Unicenter NSM R11.

IBM is driving several key standards for capturing and sharing data about the IT environment, says Ric Telford, vice president of autonomic computing at IBM’s Tivoli unit. They include the Solution De-

ployment Descriptor Standard, which describes the specifications for deploying an operating system, server or application; and Configuration Management Databases, which describe the state of all the components within the IT infrastructure.

Hewlett-Packard Co. has a proven set of management products and a large installed base with its OpenView management suite, says Elliot. It has also developed products such as Business Process Insight, which focuses on automation.

CA Inc. “has really put a lot of work into integration” within its Unicenter suite of management applications, Elliot says, “but with a recent spate of acquisitions” has yet more integration work to do.

BMC Software Inc. provides a number of infrastructure management tools, such as its BMC Virtualizer line, which provides automated, policy-based provisioning of additional capacity for applications running on virtual machines or physical servers.

EMC Corp., owner of VMware, has bought network manager vendor Smarts Inc. With its presence in large firms, EMC “is one acquisition away from changing the game for a lot of players,” says Elliot.

Microsoft Corp. is a “sleeping giant” — aggressive with rollouts “but late to the game in virtualization and still Windows-centric,” he says. Microsoft is developing its own virtualization management software, code-named Carmine, says Eric Berg, a director in the Windows and enterprise management division. Next year, the company plans to release Systems Center Service Desk, which will link people, processes and technologies to solve problems, manage assets and provide change management.

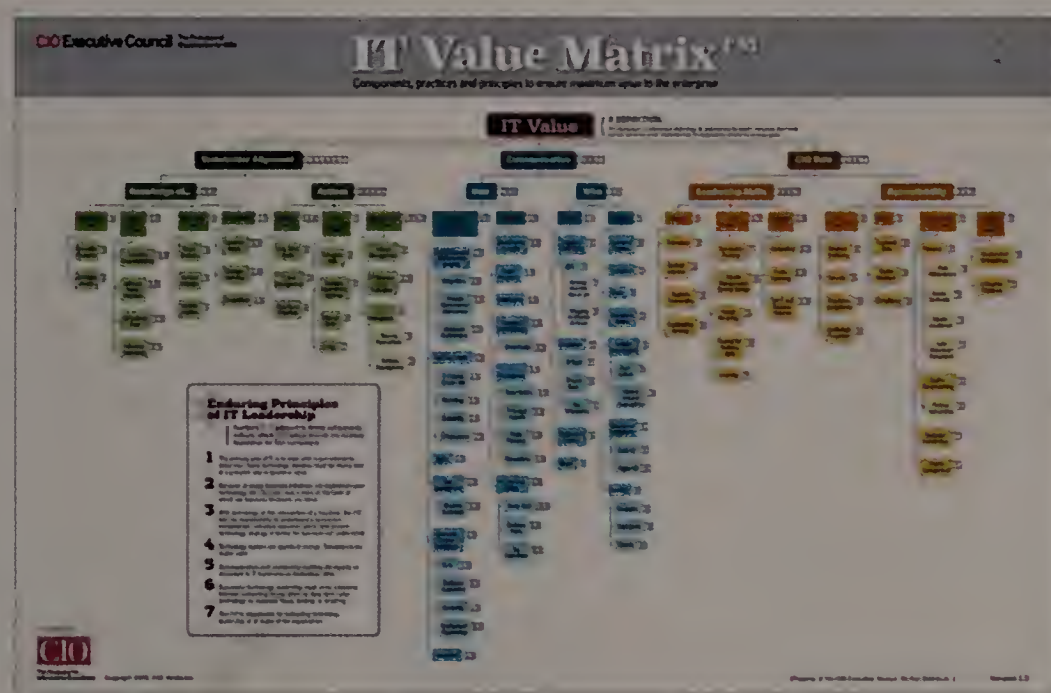
— ROBERT L. SCHEIER

How do *you* maximize the value of IT?

IT is still one of the most misunderstood functions in business.

The CIO Executive Council, a professional community developed by CIOs, has focused its members' collective effort on this challenge. Their initiative has resulted in groundbreaking tools—the IT Value Matrix and Knowledge Center™—to help leverage the value of IT throughout the organization.

The IT Value Matrix illustrates the principles and practices essential to creating, identifying and communicating IT's value to the enterprise. Its online Knowledge Center provides best practices contributed by Council members, supplemented by case studies and how-to articles from *CIO* magazine that are grouped in categories that correspond to all the components of the Matrix.



Visit www.cioexecutivecouncil.com/it_value to get your own copy of the Matrix and to watch the IT Value webcast, presented by Agrilience CIO and Council member Steven John.

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The CIO Executive Council was created by readers of *CIO* magazine and leaders within the community of CIOs to leverage the individual and collective strengths of its members by serving as unbiased and trusted advisors to each other, and by advancing the CIO role and profession. In just two years, more than 300 CIOs worldwide from various sectors and industries have identified with the Council's vision and committed to assist each other, cultivate their own careers and those of their team, and advance the role of the CIO.

To inquire about membership, visit www.cioexecutivecouncil.com.

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Research Insights

The next-generation data center is clearly a system in flux. In a joint *Computerworld/CIO* survey, close to half of the respondents reported that their companies will expand their data facilities within the next three years, and almost one quarter said they are planning to reduce or consolidate their facilities. Most are seeking to cut costs (63%), but an almost equal number expect more: They want their data center overhauls to bring new capabilities without increasing costs (60%).

IT managers also want things simpler. When asked about con-

solidation techniques, respondents said they expect server virtualization and standardized hardware to make their data centers simpler to manage (66%) and more energy-efficient (48%).

Yet there are worries, too: 44% said they are concerned that consolidation won't reduce costs but will shift expenses to other areas. And the same number of respondents worry that the skill set needed to manage consolidated data centers will actually expand. ♦

*Respondents could choose all that apply.
SOURCE: EXCLUSIVE COMPUTERWORLD/CIO SURVEY OF 389 IT EXECUTIVES, CONDUCTED MAY 2006

Expert on Staff

Which of the following statements describe your current data center environment?*

IT staff is composed of specific experts for most areas. **52%**

IT staff is composed mainly of generalists who can handle multiple operations. **46%**

Data center relies heavily on homogeneous environments to reduce complexity. **41%**

Data center is largely automated (lights-out); IT staff handles exceptions vs. routine maintenance. **34%**

Data center relies heavily on heterogeneous environments to deliver best-of-breed functionality. **24%**

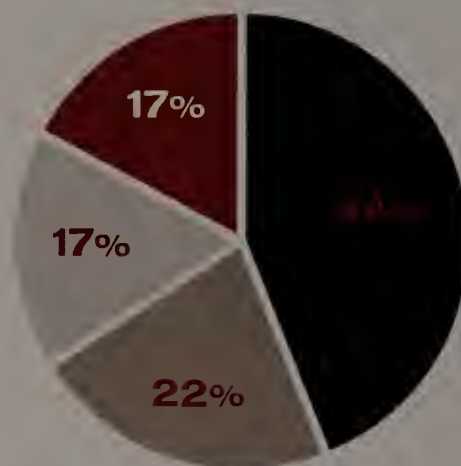
Data center is broadly distributed and/or managed significantly by remote staff or providers. **18%**

Data center relies extensively on virtualization to reduce use of proprietary hardware. **15%**

Data center is outsourced to one or more third-party hosts. **15%**

Mainframe, Be Gone

Mainframes once dominated data centers, but their importance has decreased in recent years. Which of the following most closely describes the outlook for your mainframe environment over the next three years?



■ We will completely eliminate our mainframe environment.

■ The number of MIPS we have will remain steady.

■ The number of MIPS we have installed will decline from current levels.

■ We will grow our MIPS primarily due to new applications.

IT Takes the Lead

Which groups are involved in the space planning for your company's data center?*

IT **72%**

A facilities committee/physical plant committee **36%**

Executive board **17%**

All of the above **28%**

Other **3%**

Simplicity, Please

Many enterprises are told to consolidate their data centers to reduce their scale and operational costs using techniques such as virtualization and standardized hardware. If you were to consolidate your data center, what outcomes would you expect?*

The data center will get simpler to manage. **66%**

The data center will become more energy-efficient. **48%**

The data center will need less hardware. **47%**

The data center will require fewer staff resources. **47%**

The data center will get smaller. **24%**

Shifting Burdens

If you were to consolidate your data center, which issues would be of greatest concern?*

The skill set needed to manage the data center will increase. **44%**

The overall data center cost won't change significantly but will shift from one area to another. **44%**

The consequences of system failure increase unacceptably. **42%**

Data center productivity drops. **20%**

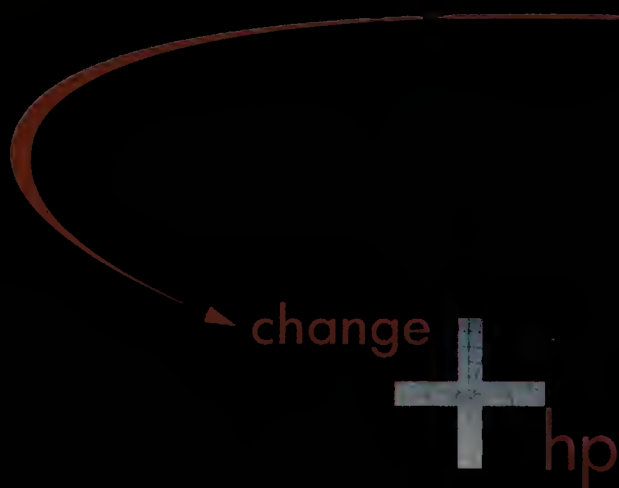
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FROM INCEPTION TO IMPLEMENTATION—I.T. THAT MATTERS

Technology

Microsoft's next big operating system upgrade has a wealth of new business features—but how badly do you really need them?



On the Lookout for Vista

BY DYLAN TWENEY

OPERATING SYSTEMS | Microsoft's first major operating system upgrade in five years, Windows Vista, is expected to hit the retail shelves in January.

Originally scheduled for 2003, Vista's release date was pushed back many times due to development delays. And the delays have created openings for the growth of competitors, such as Apple on the desktop and Linux on the server. But Microsoft's market share remains overwhelming. Like it or not, Vista will eventually become Microsoft's default OS. So the question is not whether you'll be making the switch to Vista, but when.

In fact, if your company has a volume licensing agreement with Microsoft, you'll have a chance to upgrade to the client version of Vista as early as November, when the operating system will be shipped to computer manufacturers and other large customers. (The server version of Vista, still nicknamed Longhorn, isn't scheduled to ship until 2007.)

Still, there are good reasons why IT managers are saying "wait and see." Upgrades are time-consuming and expensive, requiring lots of testing, training and support. Then there's the hardware. Vista's almost certainly not going to run well on older machines.

"IT managers probably won't make the investment [in upgrading] until after Vista has been on the market for awhile," says Jim Michael, secretary of the board of directors of Share,

an IBM users' group with more than 2,000 member companies representing a majority of the Fortune 500. "You may not see widespread enterprise deployment until after the first service pack comes out." And that could be as much as a year after Vista first ships.

But you'd better begin planning now. Once the OS is widely available, end users (like your CEO) will start asking about it.

Windows XP is looking a little long in the tooth, and Vista's new Windows Aero interface is a lot slicker (and a lot more Mac-like).

It will begin showing up on new desktops and laptops. And, if there's a major security attack aimed at legacy Windows XP systems, you could find yourself under very serious pressure to upgrade fast.

Security and Manageability

Vista offers some enticing features for CIOs. Perhaps primary among them are its numerous security enhancements. "This is an operating system that was built and architected in the age of the Internet," says Michael Gartenberg, VP and research director for JupiterResearch. In contrast to Windows XP, Vista will be much more resistant to Internet-based attacks, he says.

Vista also offers authentication via smart cards in addition to user name and password checking, provides more nuanced user account restrictions and offers strong, hardware-based encryption, which can protect documents when

an employee's laptop is stolen. It will also make it easier for developers to customize their own authentication strategies with biometrics and tokens.

Almost equally important are Vista's management features. "Vista will help ease the pain of deploying, supporting and managing desktops," says Michael Burk, a product manager in the Windows client division of Microsoft. Microsoft claims that administrators will be able to control desktop settings remotely via command line, eliminating the need for your IT staff to visit every desktop when, for instance, it's time to upgrade client virus-scanning software. To streamline installation, Vista will ship with a suite of disk imaging and installation tools so IT departments can configure standard installations easily and then copy them onto new computers with a minimum of fuss.

A Shiny New Interface

Vista's new interface and multimedia features may be the system's most visible enhancements. Windows XP is looking a little long in the tooth, and Vista's new Windows Aero interface is a lot slicker (and a lot more Mac-like), with transparent windows and a variety of 3-D effects.

All those effects require fairly serious graphics processing power. However, there's an option for systems with slower video subsystems. If a PC's graphics processor can't handle Aero, the user can turn it off, defaulting to a plainer but less resource-intensive interface.

Still, it's unlikely that the new interface is going to be a major factor in a CIO's decision to upgrade. "OK, so it's a cooler-looking Windows interface. I'm not sure where the big payback for the enterprise is for a cooler-looking Windows interface," says Share's Michael.

Two for the Business

Windows Vista will ship with two business-oriented versions: Windows Vista Business and Windows Vista Enterprise. "Windows Vista Business edition is optimized for small to medium-sized busi-

Alt-Upgrades

Upgrade, shmupgrade. You can get many of Windows Vista's features for free (or low cost) today, with these downloadable utilities.

Microsoft Windows Live Safety Center

(<http://safety.live.com/site/en-US/default.htm>)

Provides online virus and spyware scanning; can enhance PC performance by removing junk files and optimizing your hard drive. A related service, Windows Defender, continuously monitors your computer for spyware. Both are betas. Cost: Free.

Kensington PCKey

(<http://us.kensington.com/html/6331.html>)

Software-and-hardware product protects hard drive with 128-bit AES encryption. Unlocked only by USB key and password. Cost: \$70.

Microsoft Color Control Panel Apple

(www.microsoft.com/downloads)

Art geeks will appreciate Vista's color management tools. Marketing department can't wait that long? Give them this color-management utility for Windows XP. Cost: Free.

Axantum Software AxCrypt

(<http://axcrypt.axantum.com>)

Freeware utility integrates into Explorer and lets you encrypt any file folder with 128-bit AES encryption just by right-clicking. Cost: Free.

Microsoft Alt-Tab Replacement Stardock WindowBlinds

(www.windowblinds.net)

Makes Windows XP "skinnable," so you can redecorate your interface with any of several thousand downloadable themes—including some very Vista-like looks. Cost: \$20; site offers a 60-day free trial.

-D.

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nesses, but it's designed to meet the needs of organizations of all sizes," says Microsoft's Burk. Vista Business will include IT management tools, end user search tools for organizing and sorting through large quantities of business documents, and Tablet PC support.

Vista Enterprise is aimed at larger organizations and adds enhanced application compatibility tools, disk image manage-

pay attention to its hardware requirements. "Anyone who's buying hardware this year needs to consider getting hardware that's sufficient for Windows Vista," says Ann Westerheim, president of Ekaru, a technology service provider for small and midsize businesses. That's because the typical corporate PC has a three-year lifespan, and over the next three years, you'll almost certainly need to run Vista.

Don't underestimate the amount of work an operating system overhaul can require "It's never painless," says Logicalis CTO Jeff Reed.

ment tools (for creating and distributing standard installations), and the ability to run Unix applications on Vista PCs. Vista Enterprise will be available only to corporate customers that are enrolled in Microsoft's Software Assurance program or a Microsoft Enterprise Agreement.

Proceed with Caution

If there aren't compelling business reasons to make the switch to Vista in 2006, consider putting it off. Alternatively, you can let Vista creep into your enterprise gradually as you buy new systems that have the OS preinstalled, recommends Rob Enderle, principal analyst for the Enderle Group.

One reason for taking it slowly is that Vista's hardware requirements are steeper than those for Windows XP, and that means a lot of your old computers won't have enough horsepower to handle it. Although Microsoft has published its requirements list for Vista, Enderle has compiled his own list (see "Vista Systems Requirements," at right). But, he acknowledges, "the ideal hardware will be designed for Windows Vista—and that won't show up until the fourth quarter of this year."

Even if you're not planning on installing Vista for a year or more, you still should

And don't underestimate the amount of work an operating system overhaul can require in a large enterprise. "Those of us who have done it will tell you it's never painless," says Jeff Reed, CTO of Logicalis, an enterprise IT service provider.

Time to Get Ready

Now is the time to start learning about Vista by studying the product details that Microsoft has published on its main site and on the Microsoft Developer Network site (see msdn.microsoft.com/windowsvista). If you can get into Microsoft's beta program, you will gain firsthand experience with Vista and, even more importantly, can begin testing its compatibility with your company's key applications. Once the OS ships, you want to be prepared with an upgrade plan—and you will be upgrading, sooner or later.

"It's a question of whether you want to deal with a bunch of patches and fixes for XP when you can get everything that's

Vista System Requirements

Windows Vista will almost certainly require that you upgrade your older systems or replace them with newer models. Here are the minimum system requirements for reasonable performance over the expected three-year lifecycle of a new Vista desktop, according to Rob Enderle, principal analyst for the Enderle Group:

CPU: 2GHz processor or faster

RAM: 1GB or more

Hard drive: 80GB (10GB required for installation); Microsoft recommends Serial ATA drives

Optical drive: DVD required for installation

Current generation discrete graphics systems with 128MB of memory or then current generation integrated graphics and increase system memory to 2GB of fast dual-channel memory. Both need to support DirectX9 (DirectX10 is preferred) and the Windows Display Driver Model for Aero.

—D.T.

already incorporated into Vista," says Gartenberg. Microsoft says it will continue to maintain Windows XP and is planning to issue Service Pack 3 for XP in the second half of 2007, but the trend is clear: Vista is coming and will eventually replace XP.

The pressure will only increase in January, when (or if) Vista hits retail shelves. "Right now, Windows XP, with all its foibles, is working OK. IT managers are not chomping at the bit to rip the thing out by the roots," says Enderle. "But that could change dramatically once this thing ships." **CIO**

Dylan Tweney is a California-based science and technology writer. Respond to letters@cio.com.

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Steps to Prioritization

Too many IT projects are based on bogus cost savings projections rather than business strategy. Here's how to link project prioritization directly to value.



Most IT project evaluations are like the tail wagging the dog. They begin with IT strategy, rather than the goals of the business. In fact, IT strategy should be the third link in a chain that begins with business strategy, which in turn governs the product or service strategy, which then drives IT strategy. Let's look at how this could work in the context of a fictional midsize CRM software company:

Business strategy: Increase the customer base by 20 percent in the next year by providing increased functionality such as business operations analytics and executive dashboards.

Product strategy: Develop an alliance with a business intelligence (BI) software company to add analytical capabilities to the CRM software.

IT strategy: Create a new software platform that allows for easy integration with the BI software company and others.

IT projects: Develop a Web services-based platform that offers universal data exchange and messaging between the CRM software and the BI software.

While this hierarchy reveals whether IT projects are aligned with the IT strategy (and therefore, the business strategy), it does not determine the specific value of those projects to the business. To do that, you need to look at four (and only four) distinct drivers:

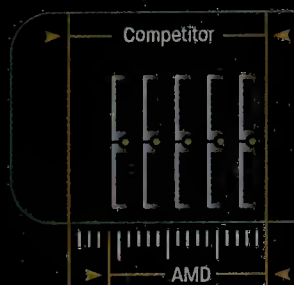
Expense reduction: In this CRM integration example, the new platform reduces the cost of developing links to other vendors' software because it is based on Web services standards.

Revenue increase: Overall revenue should increase as a larger customer base considers the CRM software.

Strategic: The software platform project has a direct impact

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on the CRM product and the company's competitive position.

Legal/regulatory/security: Security is important in the new CRM software platform because sensitive data (Social Security numbers, for example) should probably not be stored outside of the CRM system.

Each project needs to be evaluated under all four of these drivers to determine their priority and value to the business. These drivers should not be considered in isolation from the others, however. They need to be linked together in a meaningful, repeatable process for process prioritization.

The Prioritization Mechanism

The first step in creating a prioritization model is to take a top-down approach and break down each driver into various parameters. This should be done by gathering insight from business leaders across all departments to understand business focus areas and performance measurements. At the CRM company, executives decided to break down the "expense reduction" driver into four parameters: customer service expense, customer acquisition and retention, back office efficiency gains and other expense.

The second step is to score each project across all parameters, a bottom-up approach, to determine the overall project score. Projects are scored by presenting executives with a set of statements and asking for their degree of agreement on a scale from 1 to 10 (also known as a Likert scale), with specific criteria assigned to the scoring range. For example, in the CRM integration project, when executives were asked, "Do you agree that this project will result in savings for the company?" a rating of 1 meant no savings, while a rating of 10 was associated with \$20 million. This bottom-up scoring will result in final scores that will automatically prioritize the projects.

The third step is to adjust the two prioritization levers by assigning weights to the overall drivers (prioritization lever 1) and their specific parameters (prioritization lever 2) according to the current business priorities. As those priorities change,

the weights can be adjusted correspondingly, so that the score for each IT project is always in line with the business strategy. These levers should be set based on business priorities for the entire

project portfolio and not alter among projects.

For the CRM company, the weights for the strategic drivers and parameters might look like this:

Prioritization lever 1 (overall strategic driver weights):

Expense reduction (20 percent), revenue increase (20 percent), strategic (40 percent), legal/regulatory/security (20 percent).

Revenue was stagnating because the CRM product had little differentiation from competitors. Therefore, big strategic moves, such as alliances, had a higher priority than incremental revenue growth. Alternately, if the company had been in financial crisis, expense reduction would get a much higher weight than strategic.

Prioritization lever 2 (strategic driver parameter weights):

Expense reduction: customer service expense (20 percent), customer acquisition and retention (50 percent), back-office efficiency gains (20 percent), other expense reduction (10 percent). Because the CRM company is attempting to reach a larger market, reducing customer acquisition and retention costs are important. The integration project with the BI company will

The most important benefit of the model is that it can shift with the fortunes and goals of the company—just as stock analysts adjust their priorities as the markets shift.

allow the two companies to pool sales and marketing efforts.

Revenue increase: One-year revenue increase (40 percent), one-year retained revenue (20 percent), three-year incremental revenue (25 percent), gross margin improvement (15 percent). With a strategy that calls for increasing the customer base by 20 percent in one year, the CRM company weights short-term revenue improvements higher than long-term. The integration project will give the company immediate access to its alliance partners' customers.

Strategic: First mover/innovation/market defining (10 percent), fast follower (40 percent), brand enhancement (20 percent), builds awareness/upsell (30 percent). The CRM company is well-established but needs crossover into other established markets—thus, the high weighting to "fast follower" and "builds awareness/upsell." Again, the integration project with another software company fits those priorities.

Legal/regulatory/security: Legal, regulatory requirements (20 percent), labor issues (10 percent), security and fraud prevention (40 percent), compliance with corporate policies (30 percent). Customer data security is critical to the CRM company.

To prevent subjective scoring of the parameters, simple templates should be developed with objective measures that determine the scores. For example, the CRM company could create a template for "one-year incremental revenue" that includes common values such as the percentage of increase in the customer base and incremental revenue increase per customer. A template for the "customer service expense" parameter

Prioritization in Action

To see an **explanatory graphic** that puts the **prioritization levers** in perspective, go to www.cio.com/071506.

CIO.COM

could include "headcount reduction" or "call handle time reduction," which can be plugged in to determine value to the project. This value can be translated to a score between 1 and 10. This will prevent managers with a higher political influence from inflating the scores on their projects.

Once all the projects are scored, they can be sorted to determine the projects that make the cut. This cutoff point can be based on total number of projects an organization can absorb, total investment funds available or other constraints that the company is operating under.

Manage the Model

Of course, all models work well on paper. No prioritization model is going to be completely accurate, and people will inevitably try to manipulate the results. To minimize the problems, you can take a number of basic steps. First, develop

criteria to define what constitutes a project and enforce these guidelines so that projects are compared on equal footing. Having a clearly defined project scope and a project charter will be necessary first steps in enforcing these guidelines. Second, don't score every project—for example, maintenance projects (such as database software upgrades) should not be subjected to strategic analysis. Finally, consider limiting the total number of projects a department can request within a given year so that the process is not flooded with requests. This limit has to be different for different departments based on business priorities. For example, because the CRM company is trying to grow its customer base through product enhancement, it will allocate more investment dollars (and thus a higher project request limit) to product development than it will to sales or marketing.

IT Moves with the Business

The most important benefit of the model is that it can shift with the fortunes and goals of the company—just as stock analysts adjust their investment portfolio priorities as the markets move up or down.

Even better, the strategic levers give CIOs the capability to prove the value of projects that may have relatively low ROI while lowering the priority of projects that may show high ROI but have little strategic value to the company. This broader analysis aligns IT strategy with business strategy and ensures that IT project prioritization isn't just about projected cost savings. **CIO**

Sai Machavarapu is a director of IT at Hoover's. Send comments to Executive Editor Christopher Koch at ckoch@cio.com.



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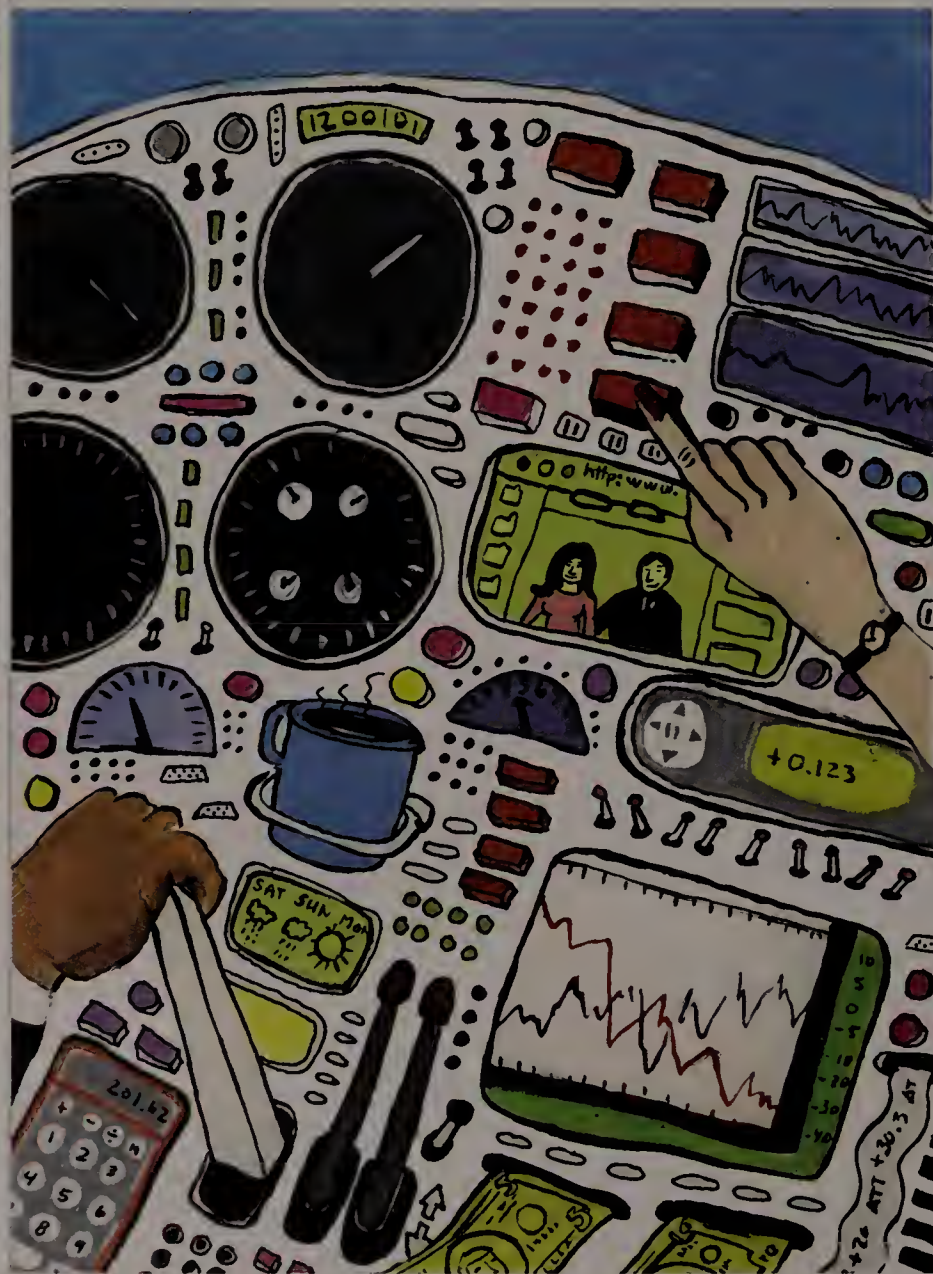
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See the full details of this case study at
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Visibility for the Board

With boards of directors under increased scrutiny by regulators and other entities, CIOs should consider creating a digital dashboard that gives them a view into the key performance indicators of the business



Atad tired of those demanding Sarbanes-Oxley and other compliance implementations? Want to dramatically raise your profile with your CEO, CFO and corporate counsel? Do high-impact professional risks intrigue you?

Then consider making an offer your company's board of directors may dare not refuse. Create a "digital dashboard" and database that puts all the information a nonexecutive director might need right at his fingertips: compensation levels, capital spending histories, changes in accounting rules and so on. Treat the board like a business unit. Support directors as if they were C-level peers. Turn them into valued customers and clients for your IT shop. Learn from them. And yes, give them tech support if they ask.

The reason is as obvious as, say, an Enron trial in Houston. Litigators and regulators are making directors ever more accountable for their actions and inactions. The future of global enterprise doesn't merely reside in better management or superior leadership; it's now contingent upon good governance. That's not an annoying business trend—it's a transcendent legal principle. Companies defy it at their peril. And the importance, liability and legal exposure of nonexecutive directors will be even greater five years hence.

Once upon a time, independent directors with sterling résumés could successfully plead ignorance if their board-approved mergers, acquisitions, hiring, firing or audits went awry. Today, they can still plead ignorance. However, they'll be doing so under oath before judges and juries legally empowered to interpret ignorance as negligence. Ignorance isn't bliss. There are good reasons why Directors & Officers' insurance

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Of course, nonexecutive directors are free to trust whatever data they get from the CEO, CFO and the auditors. However, if you were on a board that was increasingly being held to stricter standards of accountability, wouldn't you like to have your own information window into the enterprise? Wouldn't you like to show a court of law that you demonstrated fiduciary "due diligence" as a director by digging deeply into the data? Yes? Then "Hello, CIO!"

The harsh truth is that the law is herding directors into investing more time and effort into more serious governance. The simple fact is that you can't have good governance without good information.

The challenge is shockingly obvious: CIOs should be taking the lead in working with their CEOs, CFOs, corporate counsels and, yes, the auditors, in developing customized systems to support the board.

Might this put the CEO, CFO, corporate counsel and the auditors in an awkward position? Absolutely. Doing the right thing is always risky. Then again, not doing the right thing is even riskier.

Time to Show Initiative

Let's be blunt: The overwhelming majority of the time, CIOs are reactors. They're desperately responding to whatever last-minute requests come from the lawyers or the investment bankers or the CFO on some board-level issue. When they successfully scramble to deliver the goods on deadline and in desired formats, they're taken for granted. When the data is late or missing, they get blamed. That's life, but there's nothing proactive about their role.

The rise of accountability-driven governance is an excellent opportunity to change that. Smart and gutsy CIOs will make the most of it. They will work with their CEOs, CFOs and corporate counsels to work with the board. They'll be proactive. They'll informally chat with lawyers and nonexecutive directors at other firms to get a sense of what kind of customization is necessary. They'll mock up some digital dashboards and take them into, say, the CFO's office and ask, "What do you think?"

A CIO at a billion-dollar U.S. retailer did exactly that and the CFO's initial reaction was outrage. Who the heck did the CIO think he was? The CEO was more relaxed. He calculated that this proposal would make him look smart. He had the CIO present it as a trial balloon. The directors didn't want their own system but they did want earlier access to the CFO's numbers. So IT set up a secure webpage on the corporate site for the directors to log into. Everybody was better off.

The key? The CIO demonstrated initiative in a way that didn't threaten the CEO but addressed an unexpressed desire of the board. (The CFO was reportedly still annoyed but now took the CIO much more seriously as a corporate player.) The best way to accomplish this is to partner with one's C-level peers and colleagues to better serve the board. Then again, some colleagues are better partners than others.

Of course, if the CIO really wants to raise her profile, maybe she informally raises this offer to a sympathetic director who serves on the compensation or audit committee (the two board committees most likely to get an independent director in trouble.) That's truly high-risk. Disintermediating your colleagues is corporate hardball. If the corporate counsel, CFO or CEO isn't amenable to creative collaboration around "director

Let's be blunt: CIOs are reactors, desperately responding to whatever last-minute requests come from the lawyers or the investment bankers or the CFO on some board-level issue.

dashboards," maybe that's vital data for the CIO to know. A serious independent director might find that informal conversation useful and revealing too. So would a director who's nervous about liability. Can this be done without undermining the CEO? Of course. The better question is whether your company's board understands and appreciates that it must have executive relationships above and beyond the counsel, the CEO and the CFO.

A healthy and productive relationship with the board is a reasonable goal for a world-class CIO. Moreover, in this era of complex compliance infrastructures and global regulation, a healthy and productive relationship with the CIO is an essential goal for a world-class board.

For CIOs, productive board-level relationships are essential for professional development. While there's a wealth of management literature about how CIOs should lead their people and better collaborate across the enterprise, there's a paucity of information about "managing up"—that is, what role CIOs should play not only in empowering C-level executives but also in improving information, interaction and governance at the board level. Using IT to help the board manage itself may be as important for tomorrow's CIO as using IT to cut costs and grow revenue for the enterprise. As crucial as IT governance may be, corporate governance is even more important. CIOs should recognize that and act accordingly. **CIO**

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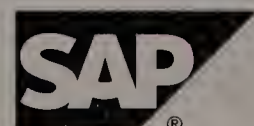
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Privacy Is Good Business

When it comes to collecting your customers' data, less is usually more



It seems that not a day goes by without news about lost or stolen personal data.

Some of the most widely reported breaches involve personal data collected and stored on company networks. Crackers recently stole credit and debit information from a BJ's Wholesale Club customer database, and in another incident, accessed the credit card, debit card and checking account information of more than 1.4 million customers of DSW, a shoe discounter.

The problem is not limited to individual corporations. Data aggregators such as Acxiom, ChoicePoint and LexisNexis collect and sell personal information on virtually every American. At one time or another, each of these companies has had to notify hundreds of thousands of individuals across the country that their personal information was accessed by unauthorized individuals. The Federal Trade Commission recently fined ChoicePoint \$15 million after it sold sensitive personal information to con artists who then used the data for fraudulent purposes.

Yet despite growing concerns about privacy and the security of personal data, most American companies still collect too much personal information from their customers without giving them a choice on how this data is used, shared, sold or retained.

Opt-Out, Opt-In—Same Difference

Indeed, just over half of large U.S.-based companies offer an opt-out choice to customers, according to a new study by the Ponemon Institute (the company I founded). And even fewer companies—23 percent—operate on a consent or opt-in



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approach. (With an opt-in policy, companies will not collect personal information unless their customers specifically consent or opt in.)

Even if companies do offer opt-out, it can be a very frustrating experience—much like calling customer service at your telephone company to complain about their billing error.

And there is no guarantee that personal information will actually be stricken from the company's customer contact database. Not only are Americans increasingly worried their personal data may fall into the wrong hands but they

are also becoming more anxious about omnipresent surveillance of their personal lives by the government. In January, the Ponemon Institute conducted a survey on whether search engine Google should release Internet search information to the federal government. More than 56 percent of respondents in our study said that Google should not release Web search information to the government.

Some recent surveys indicate that privacy concerns are behind the recent plateau in the numbers of people who bank online. And privacy experts say that they foresee an increasing number of lawsuits against corporations from angry consumers whose personal data has been breached. Recent government enforcement actions have also raised the bar for companies. In its ruling against DSW, the FTC required the shoe retailer to establish a comprehensive information security program that includes administrative, technical and physical safeguards.

Where the CIO Fits In

I believe that it is "good business" for American companies to be more responsive to customer and employee privacy concerns. After all, when a company succeeds in creating a trusted relationship, many customers do, in fact, appreciate the personalization of marketing messages that making their personal data available can enable and are therefore willing to share more information about their purchasing habits and lifestyle.

As the chief information steward for their companies, CIOs are in a position to take a leadership role here. When all is said and done, you are most likely the executive who has to create a cohesive data protection strategy within your enterprise and, if your company is outsourcing, outside it as well. It is up to you and other top executives to ensure that all of your business partners maintain the same level of vigilance as you do over the information entrusted to them.

What You Can Do to Safeguard the Data

One of the lessons learned from recently publicized data breaches is that the failure to properly secure personal infor-

mation can be very costly in terms of lawsuits, fines, diminished reputation and customer churn. Hence, it is always a good idea for companies to be honest and open with people whose data has been entrusted to them. That means posting privacy policies that are easy to understand. Remember, not everyone has a law degree. Transparency also requires the

It is always a good idea for companies to be honest and open with people whose data has been entrusted to them.

company to explain clearly how personal information is being used and why it may be shared.

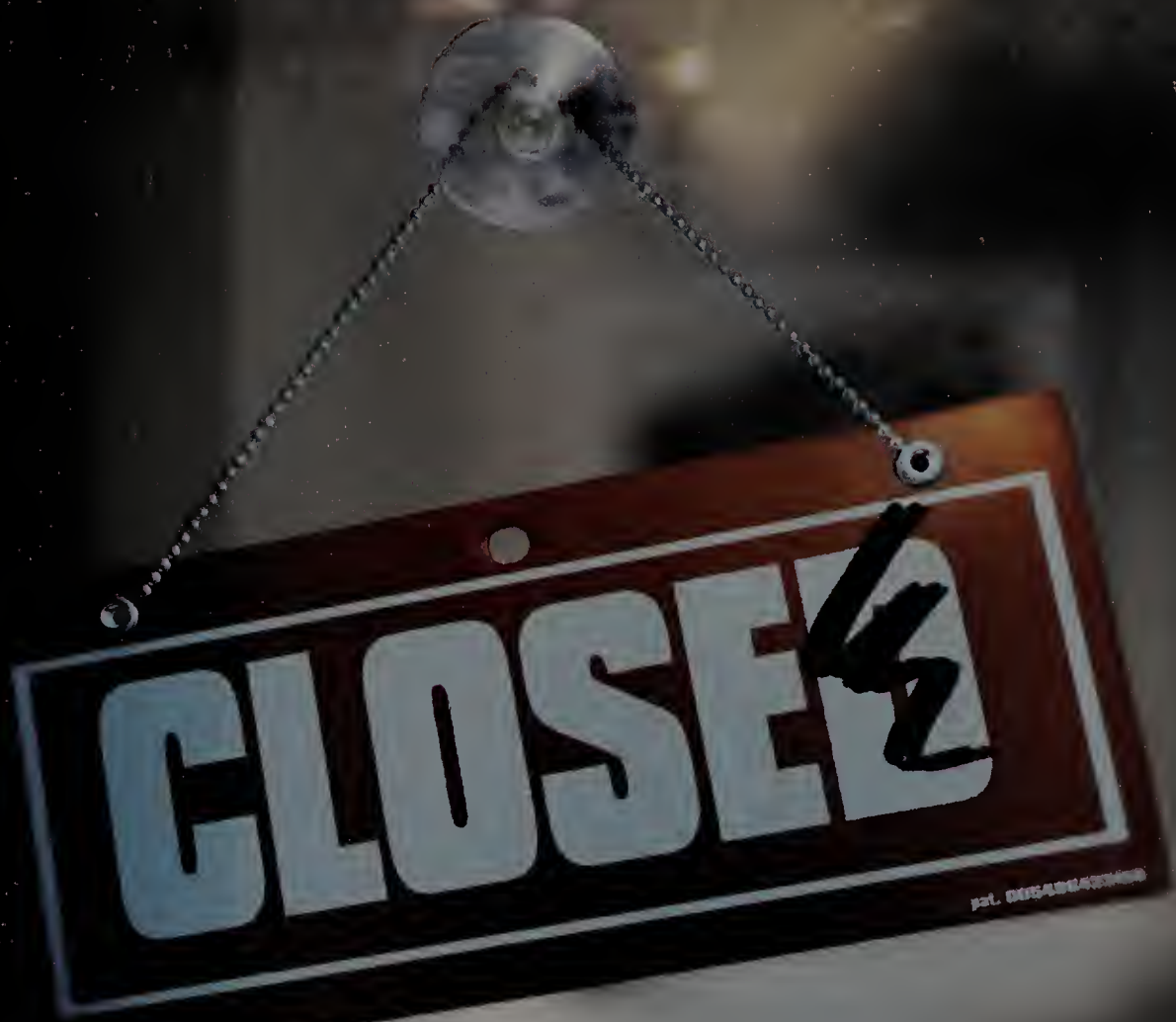
CIOs should also consider installing technologies that make it easier to manage customers' privacy preferences and track illegal data movement. Effective use of these technologies will promote a higher sense of confidence that your organization is committed to protecting privacy, thus protecting your brand or reputation. As you put these technologies in place, keep in mind that not all personal information is considered equal in terms of potential sensitivity. CIOs should know where in the organization the most sensitive types of personal data (Social Security numbers, credit card accounts and health records) reside and make sure this data is secured at a higher level than other types of information.

IT executives should also make sure that their companies do not collect too much information. This is tricky, since marketing departments often have ambitious goals for targeting customers to increase revenue and that, in turn, results in pressure to collect as much information as possible. In the privacy game, however, less should always be preferred to more. The key is to collect just what is needed to get the job done. In addition, CIOs need to take steps to ensure that personal data the company collects is accurate and current. One way to improve accuracy is to provide customers with the ability to access and, if necessary, correct, personal information collected about them. And when personal data is no longer relevant (or required by law), companies should get rid of it. The storage of stale or outdated personal information is almost always a threat to privacy.

The CIO must be proactive in making sure the organization can "walk the talk" when it comes to its privacy and data protection commitments. While this is a difficult and politically risky task, in the end your company will thank you for taking on this leadership role. **CIO**

Larry Ponemon is founder and president of the Ponemon Institute, a research think tank dedicated to privacy management. He can be reached at larry@ponemon.org.





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CHINA BUILDS A BETTER
INTERNET

Americans have been hogging Internet addresses for decades, leaving late-comers like China to divvy up the few remaining slivers. But China is fighting back by vaulting to an addressing standard that could rewrite the rules of the Internet—and business innovation—for decades to come.

BY BEN WORTHEN



Reader ROI

- ⌘ Why the Internet is running out of address space
- ⌘ How IPv6 could save 30 percent on infrastructure costs
- ⌘ How to avoid an upgrade crisis

ON a Friday night in mid-April, a gang of Friendlies, the multicolored, panda-cum-Teletubby-like creatures, which are the official mascots of the 2008 Olympics, mill about awkwardly, waving to confused tourists stumbling out of the bars that ring Houhai Lake in Beijing. Several miles away, construction crews are working around the clock on the Olympic stadium and other venues, trying desperately to keep to their schedules for the opening ceremony two years away.

Meanwhile, out of sight, in research labs throughout China, engineers are busy working on another project that the Chinese government plans to unveil at the Olympics: China's Next Generation Internet (CNGI), a faster, more secure, more mobile version of the current one. And unlike the Friendlies and the stadiums, which the world will forget as soon as the games end, CNGI's impact will be felt for decades.

CNGI is the centerpiece of China's plan to steal leadership away from the United States in all things Internet and information technology.

The strategy, outlined in China's latest five-year plan, calls for the country to transition its economy from one based almost entirely on manufacturing to one that produces its own scientific and technological breakthroughs—using a new and improved version of today's dominant innovation platform, the Internet. "CNGI is the culmination of this revolutionary plan" to turn China into the world's innovation capital, says Wu Hequan, vice president of the Chinese Academy of Engineering and the chairman of the CNGI Expert Committee, the group overseeing the project. "We will use it as a way to break through and be competitive in the global economic market."

The technology at the heart of CNGI is an emerging communication standard called Internet protocol version 6 (IPv6). The Internet protocol is the Internet's version of a postal envelope, containing information such as the destination and return addresses, and details about a package's contents. The current standard, IPv4 (IPv5 never made it out of the lab), doesn't have enough unique addresses for every would-be user in the world to connect to the Internet. IPv6 solves this problem, and is also more secure and efficient than its predecessor. For these and other reasons, most experts agree that a shift

to an IPv6-based Internet is inevitable.

China is betting that by moving to the next-generation Internet before the rest of the world, China's researchers, academics and entrepreneurs will be the first ones to develop applications and services that take advantage of the new capabilities. (China isn't alone in this thinking. Japan and Korea have also launched national initiatives to move to IPv6.) If all goes according to plan, those services will be commercialized, making China home to the next wave of eBays and Googles. But China is also working on ways to use IPv6 to enhance its now infamous control over Internet traffic into and out of the country—which could have dramatic security implications for the United States (see “A New Weapon for Control and Intelligence?” below).

A NEW WEAPON FOR CONTROL AND INTELLIGENCE?

China's NextGeneration Internet could further tighten its control over Internet access and traffic while offering a strategic advantage in foreign intelligence

China's censorship of the Internet and its tight control over traffic in and out of the country are well known. Internet protocol version 6 has the potential to give China an even tighter grip. Because each Internet-connected device has a unique IP address, it could be easier for the government to track users who post pro-democracy messages online or who try to use the Web to organize protests. Members of the international IPv6 community say that every IPv6-enabled device will come with two addresses that a user can flip between: an authenticated one for transactions and an anonymous one for Web browsing and other activities. But because next-generation Internet service is not commercially available in China yet, it remains to be seen what the real-world implementation will look like.

China's NextGeneration Internet (CNGI) has U.S. national security implications as well. While the level of Chinese military involvement in CNGI is unclear, the People's Liberation Army has designed its own IPv6 router, and a recent China IP Council white paper mentions that IPv6 networks have “military and intelligence” uses. *Unrestricted Warfare*, a widely translated treatise on military doctrine written by two People's Liberation Army officers, calls for China to engage the West in nontraditional combat, and suggests tactics such as computer hacking and cyberterrorism.

Meanwhile, if China moves to an IPv6 network while the United States is still running IPv4, Internet traffic coming from China will be impossible to track back to its source, says James Mulvenon, deputy director of the Center for Intelligence Research and Analysis, which advises the U.S. intelligence community. “Imagine if you are running an army network at Fort Hood and you detect hostile packets,” he says. If the packets are coming from or through China, “you can't tell anything about them. It turns China into a big anonymizer.” —B.W.

Call CNGI the first-mover advantage to end all first-mover advantages. “[China is] looking to leapfrog the U.S.,” says Michael Gallagher, who was assistant secretary of commerce for communications and information, and President Bush's top adviser on Internet issues before joining the law firm Perkins Coie in February. According to Chinese and U.S. sources familiar with the project, the Chinese government has already invested close to \$200 million in CNGI and has created a special office of the State Council dedicated solely to the project. China's major telecommunications companies, each of which is responsible for building a portion of the network, have also spent hundreds of millions of dollars so far. Today, CNGI connects 100 universities, 100 research institutes and 100 companies in 20 cities. At the Beijing Olympics in 2008, China plans to use CNGI for everything from broadcasting the events to controlling the Olympic facilities.

THE COMING THREAT

The United States is still the undisputed leader when it comes to the Internet. “[But] we cannot let our current success become a liability, with a continued reliance on the present protocol, while everyone else moves forward,” says Rep. Tom Davis (R-Va.), chairman of the House Committee on Government Reform.

But that's exactly what's happening, in large part because few people in the United States know the threat exists. “Over time IPv6 could revolutionize what we can do with the Internet,” says David Powner, director of information technology management issues for the Government Accountability Office. “My concern is that we will get behind.”

If China gets too big a head start, U.S. CIOs could be in the unfamiliar position of having to play catch up to the rest of the world—while paying as much as 30 percent more to manage their networks, according to estimates by the National Institute of Standards and Technology. Worse, organizations that lag behind the world in IPv6 adoption will be more vulnerable to hackers and other security threats. According to research by the U.S. Department of Commerce, the cost for an enterprise to build an IPv6 infrastructure is minimal if it is spread out over time as part of the normal technology refresh cycle. However, companies that wait until demand for IPv6 services emerge—either from overseas business partners or U.S. customers—could face a massive onetime hit in the ballpark of what it cost to fix the Y2K problem.

And while China's first-mover advantage is by no means a given, China has already established itself as the world's leader for IPv6, and, accordingly, is positioned in IPv6-related standards organizations. That could mean that the next-generation Internet is China-centric, the way the rest of the world feels the current one is U.S.-centric. "We used to be behind on the Internet," says Xiang Yangchao, executive vice president of Digital China Networks. "But we hope that we can become the leader of the IPv6 Internet."

"The Chinese are competing with us," says James Lewis, senior fellow at the Center for Strategic and International Studies. "We need to recognize that and figure out how we are going to compete with them."

WHY CHINA NEEDS A NEW INTERNET

The story of China's Next Generation Internet project began here in the United States in 1983, when the Internet, a Department of Defense project connecting a select group of academics and researchers, adopted an addressing system, IPv4, so that computers connected to the Internet could each have a unique identity for recognizing and communicating with each other. The addressing scheme, which uses a series of four decimal values, each of which can be a number from 0 to 255 (also known as 32-bit addressing), has a total of 4.3 billion possible addresses. In 1976, when computer engi-

total, serving an online population of about 200 million.

That has left relative latecomers to the Internet, like China, in a bind. China, which is expected to surpass the United States as the world's biggest Internet user later this year, has just 2 percent of the world's IP addresses, or around 60 million—about as many as Stanford University. To its credit, the Internet Engineering Task Force, the organization responsible for setting standards on the Internet, saw this problem coming a long time ago and formally adopted a replacement standard, IPv6, in 1994. IPv6 solved the address shortage by increasing the number of decimal values in each address from four to 16 (or 128 bits), resulting in a near infinite number of combinations—enough addresses for every grain of sand on the planet, for example, or for every person alive to have about 50 octillion unique IP addresses. IPv6 can also recognize IPv4 traffic, allowing network operators to phase out the old standard over time.

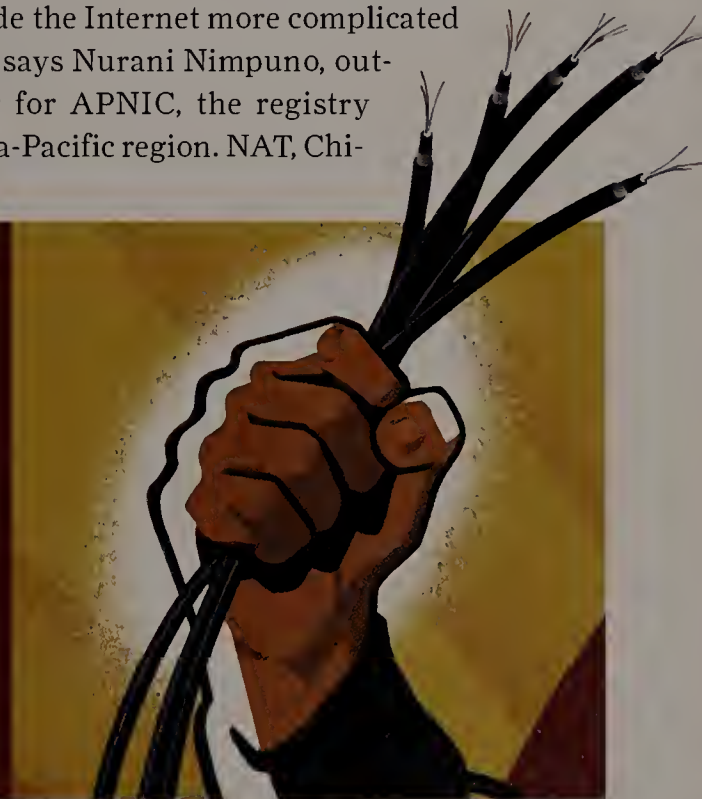
But before IPv6 could gain any traction, engineers developed a workaround to IPv4's address limitations so they could avoid rebuilding their Internet networks. Dynamically assigned IP addresses allow ISPs to give a user a temporary address that is reclaimed at the end of an online session, and Network Address Translation (NAT) devices allow multiple users to connect to the Internet through a single IP address. This saved the world from a costly infrastructure upgrade, "but NAT also made the Internet more complicated and more fragile," says Nurani Nimpuno, outreach coordinator for APNIC, the registry that covers the Asia-Pacific region. NAT, Chi-

Your Hidden IPv6 Network

Are you building an IPv6 network without even knowing it?

If you've bought any new network equipment over the past few years, then chances are yes. Most commercially available routers and switches recognize both IPv4 and IPv6 traffic, as do Windows, Linux and Mac OS. But that doesn't mean your network is IPv6 ready—that would require a full network redesign. Meanwhile, don't ignore the IPv6 capabilities you may already have. Most applications, including network monitoring software, won't register a user connecting with an IPv6 address, making it possible for hackers to enter the network undetected. Disable the IPv6 capabilities wherever possible until you are ready for the transition.

—B.W.



neers Vint Cerf and Robert Kahn developed IPv4, that seemed like plenty. "[A longer address] sounded just a little excessive in 1976," Cerf said at a government roundtable in 2004. "I mean, after all, [the Internet] was an experiment. So I thought, well, 4.3 billion addresses should be enough for an experiment."

At that time, the Internet was a mostly American phenomenon, so U.S. universities, commercial ISPs and some companies gobbled up large blocks of IP addresses on a first come, first served basis. Today, U.S.-based organizations have more than 1.2 billion IP addresses, close to 30 percent of the theoretical

na's dominant strategy for parsing out precious IP addresses, introduces more intermediate connections between computer users and the Internet, increasing susceptibility to slowdowns and interruptions and complicating high-bandwidth, real-time services like voice over IP or streaming video.

Given that China will have almost twice as many broadband users as the United States by the end of 2007, the sense of injustice among China's Internet officials is palpable. "When 26 Chinese share one Internet protocol address, while each American possesses six IP addresses...this is the quandary

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facing China in the IPv4 era," Zhao Houlin, director of the International Telecommunications Union, said in 2005. The bottom line for China, says Jiang Lintao, chief engineer at the China Academy of Telecommunications Research, is that "We cannot survive without IPv6."

THE LEAPFROG EFFECT

Latif Ladid, organizer of the IPv6 Global Summit, the world's largest IPv6 conference, recalls being unable to order a drink at a café inside the Beijing International Convention Center when the conference was first held there in 2004. In April 2006, sitting at the same café, the conference humming 100 feet away, he had no problem. "Now everyone speaks English," he says.

And that's just the beginning of China's accommodations to the West.

A bellhop at one of the conference hotels has adopted a Western alias, Harrison, to save foreign guests the trouble of having to decipher and pronounce his real name. A Chinese technology PR woman changed her Western pseudonym from Daisy to Edelweiss when she realized she had misidentified her favorite flower and finally settled on Dandelion after surmising that Edelweiss was too hard to pronounce.

It's all part of China's plan to integrate with—and compete against—the West, says Ladid, pointing to the 2,000-plus Chinese engineers on hand at the conference to learn about IPv6. They are the soldiers in the battle for the next Internet, the ones who will build China's new network and design the services that take advantage of it.

The innovation potential provided by IPv6 is enormous. Every device, from cell phones, to street lights, to a household thermostat, can have its own unique position on the Internet and be connected all the time. Utility companies will be able to read meters remotely over the Internet. Consumers parked outside a grocery store will be able to download shopping lists from their Internet-connected refrigerators to their BlackBerrys. Since every computer will have its own permanent IP address, users will be able to authenticate the source of e-mails or other requests, providing the means to track and prevent today's hacking, spam and phishing schemes.

For defense strategists, IPv6 is science fiction come to life. John Stenbit, former CIO of the Department of Defense, says that every soldier, spy plane and even every bullet will eventually have its own IP address, giving the military an incredible level of real-time visibility into combat zones.

The first services built with IPv6 in mind are just hitting the market. Microsoft's upcoming Vista operating system, for example, includes a feature where two IPv6 compat-

THE UPS AND DOWNS OF IPv6

Internet protocol version 6 will give every computer, cell phone and radio frequency identification tag its own unique address on the Internet, opening up vast potential for new types of communication and innovation. But getting there isn't free.

IPv6 is the nine-digit ZIP code of the Internet: It vastly expands the potential to pinpoint communications on the Internet. Every device—from cell phones to refrigerators to bullets—will have its own address, which means engineers can build a multitude of new applications and services for this greatly expanded and constantly connected network. But the good-enough nature of today's Internet and the cost of moving to IPv6 could mean that adoption is as halfhearted as it was for those longer ZIP codes. Here are the major benefits and costs:

Benefits

- ★ **Ubiquitous connectivity.** Every device on the Internet gets its own IP address and can be constantly connected—without requiring human intervention. This will spur the development of new applications and services that take advantage of the new capabilities.
- ★ **Reduced network administration.** Since every device on an IPv6 network can connect directly to the Internet, there is no need to set up and maintain internal networks. And since IPv6 devices can come online themselves, configuration becomes much easier. The Department of Commerce estimates that network management costs will drop 30 percent thanks to IPv6.
- ★ **Improved security.** Longer IP addresses mean that each device has a unique identifier. This will allow for device and user-level authentication—meaning spammers and hackers can't hide behind constantly shifting IP addresses, as they do today. The security paradigm will have to change from firewall-centric to application-centric, but once it does the Internet will be a much safer place.
- ★ **More efficient.** IPv6 is designed so that the first packet in a stream of data has all the header information for the entire cluster. The result is that IPv6 transmission takes up less bandwidth than IPv4 transmissions.

Costs

- ★ **Equipment replacement.** Over time, CIOs will need to replace all their IP-enabled devices, including routers and switches, printers and PCs, with IPv6-compatible equipment. If they do it as part of the normal hardware refresh cycle then the extra cost will be negligible. If they wait until there's a need to make a sudden, wholesale swap-out, the new hardware alone could amount to a onetime multimillion-dollar hit for large companies.
- ★ **Application rewrites.** Applications will need to be rewritten for IPv6 users. It is unclear how costly this will be—it depends on the application. But do not buy a package or upgrade to a new version without first finding out what your vendor's IPv6 transition plan is.
- ★ **Retraining.** Network administrators will need to be trained in the new environment: A full-time IPv6 network specialist will cost around \$165,000 a year, according to Department of Commerce estimates.

—B.W.

Blitzing and Intercepting Hard-to-Tackle IT Problems

Integrity Management: A Free Safety Behind Your Front Line

NO MATTER HOW GOOD your front line and linebackers, free safeties in football are fundamental. They often call defensive plays. They blitz in with their big picture view of the playing field when they see something developing and make tackles behind the line of scrimmage. And they make interceptions that save the game. So it is with Integrity Management.

When you've already got a firewall, a disaster recovery plan, monitoring tools, conference call capability for troubleshooting, redundant hardware, change management, a BSM tool, and a trouble ticket system, why on earth would you need an Integrity Management solution? For the same reason you need a free safety with his whole-field view backing up your front line.

Integrity Management fundamentally improves availability and service levels by augmenting the tools and procedures you already have in place. Given that your organization's productivity, revenue, and the value of your brand are at stake, it is your fiduciary responsibility to add Integrity Management to your defense.

Fundamental Need: Detecting Anything Abnormal

Integrity Management is fundamental because one of its core functions is to detect whether your IT systems are running normally or are being disrupted. The reality is that no matter how many defensive systems and processes you put in place, things slip through. Integrity Management detects the first signs of the abnormal behavior that results when a Trojan horse slips through system security. Or the bad change is installed. Or when the application server process queue grows because a broken index is slowing the database server. Or when the load balancer sends all traffic to the dead authentication server process because that server is least busy. Or whatever it is that's just not normal.

Most of the issues above underscore a tenet of Integrity Management, that system interdependencies, not individ-



ual component failures, are the primary threat to enterprise IT availability.

In order to understand how Integrity Management augments existing availability tools, keep in mind the holistic nature of the early warnings Integrity Management provides. Like a free safety, Integrity Management sees the play developing and acts. To shift metaphors from football to flooding, detection of water spilling over the levee is insufficient. Integrity Management picks up the early cracks. Not in order to send a storm of "new crack" alerts, but in order to predict the failure of the entire levee system ahead.

Integrity Management Strengthens Existing Tools

Integrity Management doesn't replace existing tools: it strengthens what you already have in place. There are more examples, which we leave you to fill in as an exercise, but here are a few:

When The Firewall Fails, Integrity Management Kicks In

Firewalls and other perimeter defenses are absolute necessities. But when they come under attack, an Integrity Management solution notices their abnormal load. That means you can gird for possible success of the attack or take appropriate action if the abnormal firewall load is slowing a critical IT service.

Integrity Management is even more vital when a malevolent visitor gets through or is on the inside to begin with. The fundamental nature of Integrity Management is such that it will pick up abnormal behavior that occurs after the breach. Think of Integrity Management as the motion detector portion of a very smart burglar alarm, which looks not only for perimeter penetration but also unexpected movement once the burglar is inside.



Custom Publishing

Not Just Disaster Recovery:

Everyday Recovery

Traditional thinking about availability and business continuity focuses on catastrophic events, and it's clear why such "insurance" is needed. What may be less clear is that similar focus is warranted for the many short-term disruptions to availability, whose aggregate likely cost exceeds that of the rare events that totally disrupt or displace IT operations. Rather than addressing the vague potentiality of disaster, Integrity Management mitigates the risk of the disruptions organizations experience frequently.

Besides mitigating the risk from everyday outages and service level issues, Integrity Management backs up your business continuity plan should disaster strike. Integrity Management can provide visibility into your processes for backup and for failing over to a redundant infrastructure, then focus on maximizing availability until your redundancy is restored.

Monitoring Tools Miss

Emerging Abnormalities

Traditional monitoring tools are valuable: they tell you when you have a problem on a device. But it's not enough to send an alert when a "game over" static threshold is violated. True effectiveness demands picking up the first sign of abnormality that indicates a problem lies ahead. But detecting abnormal metrics is difficult because what's "normal" changes based on the dynamics of the end-to-end system load. Integrity Management solutions learn what's normal over time in order to set meaningful thresholds that adapt to changing conditions. You get a predictive alert at the first sign of trouble rather than after trouble has occurred.

Real-time Correlation Replaces

Expensive Conference Calls

Take the example of a healthcare provider that routinely had a dozen IT specialists on conference calls for 4 to 8 hours trying to find the cause of a recurring problem. It got so bad the CIO joined the calls. Eventually, manually correlating what each specialist knew

about their silos would hit on the cause.

Integrity Management takes the events that would ordinarily come in to each IT specialist's tool and correlates them in the context of the application experiencing difficulty. The metrics that are out of normal and slowing down the application jump to

vide business services and report on both potential business impacts and historic service levels. BSM is thus useful for planning and post mortem assessments. In contrast, Integrity Management focuses on preventing rather than reporting on trouble. Like BSM, Integrity Management depends on the

Service Map, but applies analysis to it in real time to minimize the business impact when a service leaves normal operation.

Trouble Ticket Systems Need "This Trouble is Yours" Assistance

Assigning troubleshooting responsibility in distributed IT infrastructure is most effective when an Integrity Management system identifies the source of an issue and

gives the right expert the responsibility (plus information needed to resolve it).



Integrien Alive delivers Integrity Management.

the fore and the expert who owns the issue is alerted immediately. Integrity Management can even correlate a set of alerts that precede a problem. While monitoring tools would pass them on as a baffling alert storm, Integrity Management sees them as a play developing and helps you go in and make the tackle with a crisp problem recognition and resolution alert.

Seeing Into the Redundant Hardware Black Hole

One issue with virtualization is that interdependencies are hidden behind the virtualization layer. Although you address component failure with redundant hardware, interdependencies actually increase as you "simplify" architecture with virtualization. To avoid this black hole, you need Integrity Management's holistic view and correlation of issues.

When a Change is Managed But Causes Trouble Anyway

The best change management system in the world can't prevent the occasional disruptive change from taking place. A CMDB facilitates rolling them back when they prove detrimental. But the issue of detecting abnormal behavior introduced by a change remains, and that's where Integrity Management comes in.

Business Service Management in Real Time

Business Service Management tools diagram the IT infrastructure components that pro-

Integrien Alive™ Delivers Higher Availability Through Integrity Management

Alive Integrity Manager provides a unifying view into the operational "health" of business-critical services that cross multiple domains in your IT infrastructure. Alive maps a view of the most critical devices and metrics into a system of intuitive dashboards for troubleshooting problems in key services.

Integrien Alive's Integrity Management Tightens Troubleshooting Defenses

As seen in the figure, Integrien Alive tightly integrates the functions necessary to achieve true integrity in business services: dynamic thresholding (the basis for flagging abnormal behavior early); event correlation (based on statistics; no rule writing required); and an Integrity Alerts™ engine that narrowcasts the information needed to resolve a problem to the right expert.

Alive learns what's normal and "who owns what" in order to detect abnormalities and assign responsibility for correcting them. ●

For more information about how far beyond simple ROI Integrien Alive can take you by augmenting your existing approaches to availability and service levels, visit <http://www.integrien.com>

ible computers can work in the same Office document without going through a server or other host. This ad hoc networking, where one of the devices essentially acts as the server, has broad implications for computer gaming, sensors and RFID.

WILL THE BET PAY OFF?

Some Internet experts, such as Paul Francis, a computer science professor at Cornell University who also happened to invent NAT devices, say that upgrading networks to IPv6 will cost so much and take so long that engineers will develop workarounds—be it improvements to NAT devices or something new—that solve the problems with IPv4, keeping the current Internet in place forever. But most people familiar with IPv6 say that the protocol has too much promise and can save CIOs too much money for it not to be adopted. Plus, most equipment makers are already selling IPv6-capable equipment today, meaning you could be building a next-generation network without even knowing it (see “Your Hidden IPv6 Network” on Page 45). “In the next 10 years everyone will [begin] moving to IPv6,” says Robert Atkinson, president of the Information Technology and Innovation Foundation, a technology policy think tank. “That is not in doubt.” The question, he says, is how long it will take for the United States to reach critical mass on the new protocol.

The federal government is moving now, thanks to an Office of Management and Budget mandate that says agency networks must be IPv6-capable by 2008. But a June 2005 GAO study found that only one agency, the Department of Defense, even has a transition plan in place (an updated report due out this summer is expected to show more agencies making plans, however).

The major U.S. telecommunications companies, meanwhile, are taking a wait-and-see approach to IPv6, says Prodip Sen, director of data and service architecture at Verizon Laboratories. They are buying equipment that can handle both IPv4 and IPv6 traffic, and waiting for demand for the new standard to emerge. The result is a chicken-and-egg dilemma: No one wants to invest in the infrastructure until there are applications that require it, but few companies will develop those applications until there is a network that can run them.

The United States’ reluctance to invest in IPv6 makes it more likely that China will be in a position to gain the first-mover advantage it seeks. A draft version of a January 2006 report by the Department of Commerce on IPv6 contained a section on competitiveness that highlighted several threats to U.S. Internet leadership, including a further shift of high-tech R&D and product innovation eastward and less available investment capital because of the higher costs of maintaining IPv4 networks. What remains to be seen is whether China can develop the services that take advantage of the next-generation Internet. But China’s

researchers are already working on it. At the IPv6 Global Summit in April, China’s major telecommunications and Internet companies got up on stage one by one and told the audience that they have research facilities dedicated to developing these services. “CNGI will continue to be the most important topic of research for us,” says Zhao Huiling, vice president of the Beijing Research Institute of China Telecom. Similarly, the Chinese government decided that CNGI’s first users should be universities, research labs and leading companies precisely because that is where it imagines innovation will come from. Liu Dong, president of the Beijing Internet Institute sums it up succinctly: “We think we can develop the killer applications,” he says.

THE 2008 OLYMPICS: IPv6 ON DISPLAY

China plans to show the rest of the world just how advanced its Internet is at the 2008 Olympics in Beijing. CNGI will control the facilities—everything from security cameras to the lighting and thermostats—at the Olympic venues, and events will be broadcast live over the Internet. Even the taxis in Beijing’s snarled traffic will connect to CNGI via IPv6 sensors so that dispatchers will be able to direct their drivers away from congestion.

If the United States hopes to maintain its Internet dominance, it must act. But there are few voices spreading the alarm. The Department of Commerce removed the section on the competitive threat of IPv6 from its final report, because the government did not want to be seen as pushing private-sector technology projects, according to former assistant secretary of commerce Gallagher.



IPv6’s innovation potential is enormous. Any cell phone, refrigerator or thermostat can be online anytime.

But he says the government is “acutely aware” of the threat. However, Chairman Davis, who has asked the president to appoint an IPv6 transition czar and is consistently one of Congress’s most outspoken advocates on technology issues, doesn’t mind offering private-sector CIOs advice of the most urgent kind.

“We need to begin planning now,” he says. **CIO**

Senior Writer Ben Worthen can be reached at bworthen@cio.com.

China’s Internet Leap

Senior Writer Ben Worthen went to China earlier this year to research **THE NEXT GENERATION INTERNET**. Read his travel diary at blogs.cio.com/china-diary.

CIO.COM

A man with dark hair, wearing a blue button-down shirt, is standing in a room with large, ornate stone arches. He is looking slightly to his right with a thoughtful expression. The lighting is dramatic, with strong highlights and deep shadows.

Bonhams IT Director
Roland Whitehead says
his Linux servers are so
reliable that he needs
only two systems analysts
to support them.

SOLD!

On Open Source

Building an open source-based infrastructure has helped mid-market Bonhams compete with the auction industry superpowers

BY MERIDITH LEVINSON

Shortly after 10 a.m. on an April Sunday,

eager auction-goers began bidding on more than 1,100 items—paintings, furniture, decorative pieces and vintage couture—that London-based auction house Bonhams had put up for sale in its Los Angeles showroom. An image of a Jules Lefranc oil painting depicting Parisian rooftops with the dome of Sacre Coeur cathedral in the background was projected on two Sony flat-screen TVs at the front of the room. “Let’s open the bidding for this item at \$350,” announced the auctioneer, a rosy-cheeked woman with frosted blond hair. Immediately, a prospective buyer discreetly raised her paddle to bid on the painting, valued between \$800 and \$1,200. “Three-fifty in the back,” the auctioneer called. “Let’s go to four.” Another bidder raised his paddle. “Four hundred in the center of the room. Go \$450,” the auctioneer called.

The bidding continued fast and furiously in \$50 increments until the auctioneer hit

Reader ROI

- :: Why Bonhams chose to build an in-house system instead of licensing enterprise software
- :: How IT gave the auction house new leverage in the marketplace
- :: How agility translates to customer satisfaction

\$1,000, whereupon she began increasing the bids by \$100. "Do I have \$1,200?" the auctioneer asked. A man seated toward the back of the room waved his paddle. "Twelve hundred in the back of the room. Go to 13." An art collector representing a buyer on the phone raised his paddle on behalf of his bidder. "Thirteen on the phone. Go 14," said the auctioneer. The buyer who bid \$1,200 raised his paddle to bid \$1,400. "Fourteen hundred is bid in the room. Go 15," the auctioneer

number-two powerhouses respectively in the \$6 billion art and antiques auction industry. The privately held Bonhams, which conducted over \$400 million in auction sales in 2005, hopes to increase its small fraction of the market (currently 6 percent) by establishing itself as a mid-tier player and broadening its audience beyond the blue bloods who traditionally patronize auctions. Think of Bonhams as the Nordstrom of auction houses: It's high-

says he built this core system internally rather than install ERP and CRM applications in order to keep Bonhams' costs down. The trading system, he says, has supported Bonhams' growth from 200 employees and 200 annual auctions in 2000 to 800 employees and more than 700 auctions a year today without occupying the company with an expensive, time-consuming software implementation. By keeping expenses low, Whitehead says, Bonhams can sell its

"We have kept our processing costs so low that we are able to sell \$10 items and make money off them just as we will off multimillion-dollar items."

—Bonhams IT Director Roland Whitehead

announced. A hush came over the gallery. Was that it? Was the bidding out at \$1,400? The auctioneer asked, "Any advance on \$1,400?" The auction representative on the phone with the remote buyer (a Paris-based fine art dealer) whispered to his bidder that someone in the room bid \$1,400. Did the dealer want to bid \$1,500? Yes, and the rep raised his paddle. But the buyer in the room still wanted the painting too, and bid \$1,600. The buyer on the phone bid \$1,700. "I have 17 on the phone. Any advance on \$1,700?" the auctioneer asked, her eyes scanning the room for last-minute bids. No movement. With a rap of her gavel on the podium, the auctioneer announced, "Sold for \$1,700 to bidder number 2812," and then she quickly moved on to the next painting.

And just like that, in two days, Bonhams showcased 1,138 and sold 930 lots of merchandise, which is nearly 80 percent more than the average number of items Sotheby's puts on the block during one of its two-day sales.

The Nordstrom of Auction Houses

Selling more items at a lower cost is Bonhams' strategy for competing with Christie's and Sotheby's—the number-one and

end, but your last name doesn't have to be Bush or Bowles (as in Camilla Parker, the wife of Prince Charles) to shop there.

Although Bonhams has a long way to go before it poses a serious threat to Christie's and Sotheby's, it has made progress toward increasing its business. And IT—specifically a strategy of building an open-source infrastructure—has helped support and fuel that growth. Bonhams' sales have grown from a reported \$64 million in 2000 to more than \$400 million. Its customer base has tripled to 1.3 million. With the art auction industry on fire again after a three-year downturn, industry watchers say Bonhams stands to gain market share as collectors who wish to capitalize on the surge put their pieces up for sale. The secret sauce behind Bonhams' bid to grow and flourish is a home-grown auction management system, which runs on Linux and powers almost every aspect of the auction house's business, including functions as wide-ranging as property management and CRM. Bonhams IT Director Roland Whitehead

items at lower prices than the more exclusive auction houses do while maintaining a reasonable margin. "We have kept our processing costs so low that we are able to sell \$10 items and make money off of them just as we will make money off multimillion-dollar items," Whitehead says.

Auction Wars

Despite its revenue gains, Bonhams is still a distant third behind Sotheby's and Christie's in market share and auction sales. (Sotheby's, for instance, earned \$2.75 billion in auction sales last year.)

Bonhams achieved its third-place status largely through a series of mergers and acquisitions that coincided with the economic downturn in the United States. The art auction market, which was scorching during the late 1990s, took a turn for the worse in 2000 when the U.S. equity markets imploded. Suddenly, all those Internet tycoons who were rich on paper no longer had the funds to invest in Rothkos and Pollacks for their postmodern offices.

Bonhams' Stack

Database: Progress Enterprise Database

Development tools: Progress OpenEdge, MS VisualBasic, Runtime Revolution

Deployment: Apache Web Server and Formatting Objects Processor (FOP), MS Internet Information Services, Excel

OS: Redhat Linux, MS Server 2000

Hardware: IBM System x

During that downturn, Brooks, a small yet highly profitable auction house that specialized in classic cars and motorcycles, went on a buying binge. Robert Brooks, the founder and chairman of the eponymous auction house, wanted to give Christie's and Sotheby's a run for their money and set out to acquire all the auction houses in his path. He started in 2000 with Bonhams, which the Bonham family had been running since 1793. In fall 2001, Bonhams & Brooks merged with Phillips, then the third-largest auction house, to form Bonhams 1793 (the Phillips name was lost in the shuffle). In August 2002, Bonhams 1793 acquired Butterfields, which was the largest West Coast-based auction house, and now has salesrooms in San Francisco and Los Angeles under the name Bonhams & Butterfields.

What all of these companies that Brooks acquired had in common were financial troubles. Bonhams' auction sales were stagnant. Phillips had all but collapsed under the weight of its previous owner, the French luxury goods conglomerate LVMH, which spent hundreds of millions of dollars between 1999 and 2002 in what was ultimately an unsuccessful attempt to compete with Sotheby's and Christie's at a time when they were embroiled in a price-fixing scandal. And eBay, Butterfields' previous owner, nearly put the fine art auction house out of business by driving its customers to the Web.

The challenge then, in addition to restoring all these companies to profitability, was to get them on one common trading system. "You cannot have four different auction systems with four different accounting processes, four different administration processes, and four different ways of handling goods *and* keep a handle on the business," says Malcolm Barber, Bonhams' CEO of U.S. operations.

Why Bonhams Built Its Systems In-House

Bonhams' management team wanted a user-friendly trading system that would provide accurate sales, stock and customer information and would make the production of catalogs easier.

Whitehead decided to build the system in-house because, having worked with packaged applications like SAP, which Sotheby's uses, and Siebel, which Christie's uses, he didn't think they were flexible enough. He knew those packages would require heavy customization, and with that customization would come increased maintenance fees, which Bonhams couldn't afford. Given Whitehead's training as a Naval architect and product designer and the half-decade he spent from 1986 to 1992 using computers to develop World Cup racing yachts, he felt he had the know-how to develop a lower-cost system that would be more targeted to the auction industry than shrink-wrapped software.

"The cost of tailoring such [enterprise software] packages is so high. If you have the right mind-set, the right skills and the right tools, you can develop a solution at a fraction of the price [of the packaged appli-

cations] that is significantly better, and that is what we've done," says Whitehead.

Bonhams' IT director also wanted to build a single system that encompassed as many activities and business processes in which the auction house engages as possible so that he wouldn't have to patch together a bunch of disparate systems. So the system he built also includes functions for print production, managing and valuing the properties that Bonhams puts up for sale, and customer relationship management.

Whitehead, who has hired IT staff from Sotheby's and Christie's, notes that his competitors have to integrate a bunch of systems to get the functionality they need because one packaged system doesn't do it all. In fact, Sotheby's expenses grew so high by 2003 that the company outsourced the management and maintenance of its main-frame systems and laid off six IT workers as part of its cost-cutting effort, accord-

How the Houses Compare

A side-by-side comparison of Bonhams, Sotheby's and Christie's, the three biggest auction houses worldwide

	Bonhams	Sotheby's	Christie's
2005 auction sales	Over \$400 million	\$2.75 billion	\$3.2 billion
Market share	6%	43%	50%
Employees	800	1,443	1,800
Auctions held each year	Over 700	350-400	Approximately 1,000
Salesrooms around the world	15	15	16
IT staff	24	118	Declined to provide numbers
IT costs	Approximately \$1.6 million	\$59.4 million	Declined to provide numbers
Core system	A3	SAP	Microsoft, Oracle and others
Dates back to	1793	1744	1766

-M.L.

ing to a report from Wedbush Morgan Securities. By contrast, Bonhams' IT costs have dropped from \$3.5 million in 2001 to approximately \$1.6 million today because it's running fewer systems and using open source. Whitehead says his Linux servers are so reliable that he needs only two systems analysts to support them.

Whitehead's decision to build Bonhams' core trading system in-house flies in the face of conventional IT wisdom. "The default best practice across the industry is, it's better to buy than build," says

ning A3 on a bunch of small servers rather than one large server would prevent it from crashing if the system was hit with a barrage of transactions. But Whitehead discovered that the cost of licensing technology from Sun for that kind of distributed computing architecture was prohibitive. So instead he chose to go with Linux. And IBM, eager to enter the Linux market, made Whitehead an offer he couldn't refuse on its X series servers. Whitehead also uses Apache Web servers, Tomcat, the open-source version of the Java servlet, FOP, an open-source type-

acquired companies' processes into A3 slowed down the project. A3 went live six months after originally planned, in January 2003. Whitehead has said that A3 cost approximately \$800,000 to develop.

Agility for Customer Service

Whitehead says the way the system has been designed makes adding new features a breeze for developers because they don't

"You cannot have four different systems and keep a handle on the business." —Malcolm Barber, Bonhams' CEO of U.S. operations

Randy Heffner, an analyst with Forrester Research. Heffner says most companies choose to implement packaged software because they don't want to spend time and money on an activity that isn't a core competency. Bonhams chose to swim against that tide.

The Open-Source Stack

Whitehead and two developers began building the system, dubbed A3, in May 2001, well before Brooks' acquisition spree was complete. The IT director first had to decide which database software would form the core of A3. He opted for software and development tools from vendor Progress for two reasons: They were less expensive than Oracle at the high end of the market, and more scalable and reliable than Microsoft at the low end. He also liked the software because it provided a single programming language for three separate activities—coding the database, programming the business logic and writing the programs that deliver content to the Web. "That means less [for developers] to learn, fewer errors and less time spent debugging code," says Whitehead. Whitehead originally wanted to deploy Progress on a distributed computing architecture using Sun's Solaris operating system; run-

setting system, and many other open-source applications.

Whitehead is a strong proponent of open source because, he says, it's such a reliable operating system. "The cost benefits of deploying on Linux are dramatic," Whitehead notes, adding that running A3 on Linux costs less than half of what it would cost to run it on Solaris.

With the architecture in place, Whitehead and his programmers began developing a framework for storing and displaying information in A3. The framework establishes the user interface for A3 and manages all the business rules that dictate how A3 works. The application has programming logic for all manner of activities, from authenticating users to tracking properties, mining customer information and producing reports on sales activity. The application interface is stored in a database so that developers can reuse it quickly and easily when working on enhancements to A3.

Whitehead originally planned to launch A3 in the summer of 2002, but the pace of acquisitions and the need to build the

have to write a lot of new code. Forrester's Heffner agrees. "There are ways for enterprises to design applications that are flexible by doing good design and analysis up front, like it sounds like Bonhams has done," he says.

The ability to add new features to A3 quickly helps the company provide better customer service, Whitehead says. For instance, last March a customer asked one of Bonhams' appraisers to provide him with a report detailing the value of his collection in a different format than the auction house usually provides. The customer wanted the pictures of the items in his collection in a different order, and he wanted more information in the report. The appraiser told the IT department what the customer wanted. Within an hour, one of the developers produced the appraisal just as the customer requested and added the extra functionality to A3 that would allow appraisers to customize the formats of other appraisal reports. All the developer had to do was modify an existing query and produce a new report layout that could be processed into the required format. Unlike making changes to a packaged application, no big change documents had to be written up, and no consultants needed to be retained.

A3 has also sped up the creation of catalogs, which play a key role in encouraging

All About Open Source

Bonhams eschewed proprietary software and built its trading systems on open source. And they work! Bernard Golden will answer all your open-source questions at blogs.cio.com/theopensource.

cio.com

people to attend auctions. Carolyn Mani, who's in charge of Bonhams & Butterfields' Sunset Estate auctions, says it took only a week and a half to create the catalog for an 1,100-item auction that took place in Los Angeles last April. She says publishing catalogs using the old DOS-based system under eBay took twice as long. "With the push of a button, A3 sends the entire [catalog] file in Word form to our desktop publishing system. A3 also publishes it to the Internet simultaneously, so even before I have a printed catalog, my sale is online with photographs and descriptions," says Mani.

Bonhams can even react more quickly to changes in regulations. Earlier this year, the British government passed a new law called the Droite de Suite, which guarantees that living artists earn a percentage of the sale price when their work is resold (say, if a collector who purchased it in a gallery decides to auction it). Within 24 hours of the law being enacted, Whitehead's team wrote functionality into A3 that would

release proceeds from the sale of a work to the artist.

Bonhams' top executives seem impressed by all this newfound IT agility. "When we ask things of IT that will help us drive the business forward, they come up with answers pretty quickly," says CEO Barber. And when he wants to know what goods have been consigned, which are ready for sale and how each department within the company is doing, Barber turns to A3. "When you've got offices all over the world, it gives me a comforting feeling that I can get an overview [of the entire business] very quickly," he adds.

Auction Fever

At the Los Angeles estate sale in April, Bonhams' "sell more for less" strategy was very much on display. While heated bidding drove up the prices on some items, including a sterling silver flatware set that was valued between \$2,500 and \$3,000 but sold for \$6,500, plenty of items went for a song, including a Federal cherry bed-

side table appraised for as much as \$600, which sold for \$80. Ellen Sinaiko, who attended the estate sale with her miniature Dachshund, Ernie, says it was one of the best auctions she's ever attended because it was affordable and because the customer service was so good. She says she spent about \$900 on furniture, costume jewelry and a collection of tobacco jars.

"Truthfully, I was bidding because it was so cheap. It was such a bargain," she says. "Where else could I get four Pennsylvania Dutch dining room chairs for \$80?"

Sinaiko adds that she's attended Sotheby's and Christie's auctions, but prefers Bonhams' events because they're more hospitable. "The people who work there are so friendly. They really make you feel like you're welcome in their house. You don't get that feeling at most auctions like Sotheby's and Christie's," she says. "They really have a big attitude." **CIO**

Senior Writer Meridith Levinson can be reached at mlevinson@cio.com.



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Plan Globally, Deploy Locally

The CEO of Manpower explains why a worldwide IT organization has to balance global efficiency with local needs

BY CHRISTOPHER KOCH

When a company's home market is no longer its largest, "global" becomes more than an ambitious buzzword—it becomes a matter of survival. Manpower, the employment services company that began in 1948 in Milwaukee, now gets 80 percent of its revenue from outside the United States and has 4,400 offices in 72 countries.

IT plays a critical role in linking those offices together, helping drive efficiencies and best practices across them. But it's a challenge to bring those offices together without crushing their independence and responsiveness in the local markets.

Jeff Joerres knows all about this challenge. When he became chairman and CEO of Manpower in 1999, the company had just bailed on a \$92 million front-office computer system for its worldwide offices that had been plagued with huge

A global IT strategy promotes business-IT cost-sharing and efficiency, says Manpower CEO **Jeff Joerres**.



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Tapping Internal Creativity

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Innovation labs, design firms and consultants are playing an increasingly large role in the pursuit of innovative ideas. For many companies the once firmly held belief that innovation had to be homegrown is falling by the wayside. Learn how this company is maximizing their outsourcing partnerships, realizing a new way of doing business and generating innovation from outside the company.

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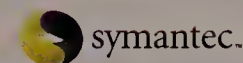
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cost overruns and delays—causing the company to take a \$57 million after-tax write-off in 1998. “We had kind of broken the golden rule that if you couldn’t get it done in a certain time frame you shouldn’t do it,” recalls Joerres. “The project had become too all-encompassing.”

Since then, Joerres’ strategy has been to make global IT investments cautiously, trying to maintain a delicate balance between global efficiencies and local flexibility. It’s been difficult. For example, offices in some countries still use paper forms in triplicate for some aspects of the candidate application process—one copy for the client, one for the local branch and one for corporate.

The paper trail is one of the things that Manpower’s CIO, Rick Davidson, is trying to eliminate in the new incarnation of Manpower’s global IT system to make the candidate application process entirely electronic worldwide. This time, the focus is on speeding routine processes while supporting, rather than dictating, processes like sales and marketing, where the locals have a chance to shine, says Joerres.

To manage that delicate balance of global and local, Joerres involves Davidson, who reports directly to Joerres,

“Doing everything globally means averaging to the lowest common denominator. We said, it’s not all global or all local. It’s the combination.”

—Jeff Joerres, CEO of Manpower

in the strategic decisions of Manpower in a unique way: He has Davidson develop the agenda and facilitate the monthly executive staff meeting. “It was my way of forcing him to be right in the middle of the action, to ferret out what’s important,” says Joerres.

CIO spoke to Joerres about his expectations for IT in a diverse global company.

CIO: You do business in 72 countries. From a business perspective, what characteristics should a global IT infrastructure have?

Jeff Joerres: In an organization as large as ours, if you do everything globally, you average to the lowest common denominator. And you never have an application that’s very good. That’s why we said, it’s not about all global or all local. It’s the combination.

Manpower

Headquarters
Milwaukee

Primary business
Staffing/employment services

2005 revenue
\$16 billion

Employees 27,000

CIO Rick Davidson

IT employees 1,100

2005 IT budget
\$250 million

Globally, we want to use IT for three things. The first is, How can global IT pursue revenue and profit? In our business, we interview 10 million people a year and put 4 million people to work. What if we could interview people faster and better?

The second global initiative we have is driving efficiency. We use paper time slips in many countries. What if I did that all electronically? I increase my speed, I decrease my error and I drive efficiency.

And then the third thing is that I want global IT to be the centerpiece for behavioral changes within the company overall. By that I mean, as an organization we have to modify our behavior to know what is global

and what is local—to accept global [processes] because [they have] breadth and speed and efficiency. So, we’re putting IT out in front of business change because we believe that IT is less emotional than many other areas, such as marketing.

What do you mean when you say emotional?

Why should we have 72 data centers? Doesn’t make any sense. Now, does that have some emotion in it? Yes. The emotion is, “If I don’t have my data center then I don’t have control over IT.” Now we have three data centers: Singapore, outside of London and in the Midwest of the United States. While [eliminating the other data centers was] emotional, it has so much logic behind it, it’s pretty hard to fight. And that’s where you get the changing of behavior [to promote global sharing].

You have to do it right and not try to consolidate at the snap of a finger, because you run the risk of actually having the behavioral changes backfire on you. [The new centers go down] and then the local offices say, See, that’s why we don’t do global. My data center’s been down for a week.

If it was mine I’d have it fixed. So, what we’ve done is to make our time lines and budgets as realistic as possible to build up credibility for the IT group.

So we have made, if you will, the proverbial turn in global IT. From having nothing [shared globally] four years ago, to now having the business field organization saying, Why can’t we do more? And that’s part of this behavioral change we’ve been looking for. Once the local offices understand that we at corporate are not trying to take power from them, but [are trying] to make their jobs more market-responsive, then they really start to get the global aspect of IT and support starts to build for [more global IT and processes].

What do you think you’ve achieved from globalization in IT?

Well, the easiest thing, and the most seductive thing, is that it drives a tremendous amount of efficiency. [But] if I only

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Business Technology Leadership

“If you only incent IT on efficiency, then you will drive out the ability for IT to look at things from a growth perspective. They would only be looking from a cost perspective. And I think that’s dangerous.”

—Jeff Joerres, CEO of Manpower

incent IT on efficiency, then everything is going to be driven toward centralization, and, in my opinion, marginalized. You will drive out the ability for IT to look at things from a growth perspective. They would only be looking at it from a cost perspective. And I think that’s dangerous.

Another thing that we have really worked on is, How do you not get IT trapped so that they own all of the cost-benefit analysis? The way we used to do it was, IT would request and own the projects. Then IT would go off and start projects and the business would say, “Oh, yeah well, I don’t know if I really wanted that.” And IT would be left holding the bag. Now, the business has to sign up for them in the budget-planning sessions.

[We also build business accountability by having] service-level agreements and chargebacks. We’re saying to the business, “It’s your IT budget. It’s allocated back to you.” It is not a perfect science. Because as soon as you try to make it a perfect science, a [local office] will find a hole in it and then say they’re being overcharged. So, we’re saying, “You’re missing the big picture. The allocation is there so that you don’t think that the [IT budget] is a honey pot.”

The other issue is this: Small countries could never do anything with IT if you do everything on an allocation basis. For example, if we put in a system and send three people to install it in the U.K., that kind of effort is not justified in the Philippines because the office is so much smaller. So we may [subsidize the small-office effort]. The big country says, Well, you charged me for them. We say, Sorry guys, that’s the way a company works! We can’t just let the smaller offices do nothing or do whatever they want because we could live to regret it later on if they grow.

How did your experience selling IBM mainframes shape your view of IT?

It showed me the complexity of building an application. Seeing that from the other side of the table has given me insight into what we *don’t* want to do with IT in our company.

What you want to do is easy; you read that in a book. What you don’t want to do involves the harder things that are behavioral driven, [like refusing to share resources and information]. I’m cynical at times with an IT budget. And the cynicism doesn’t come from inflated application costs. The cynicism comes from how much garbage is laying on the floor when the people in an organization aren’t being honest with one another.

For example, the organization decides to do a global application. And then you get into the local budget and you see some weird IT stuff in there and you find out that they’re not banking on the global IT guy coming through. So

they’re writing a new version of their own software.

That drives me nuts. Now, if you told me [you don’t think IT can deliver], you might actually get the local rewrite approved. If the application is critical to your business and global IT has not delivered, maybe that’s a good business decision. But you better say exactly what’s going on. Otherwise it’s going to get cut. Because that’s just bad behavior.

How do you root out that behavior?

You’ve got to have the dialogue. If you’re hiding something in a budget, you don’t get fired because of that. You get coached: Why are you doing that? What behavior are we exhibiting that says you should be doing that? Don’t do that again, bring it forward. Or, what is global IT doing wrong? Maybe global IT needs a kick in the butt. Now if it happens a second or a third time, it’s a different kind of discussion.

Your company’s labor market research has said that there’s a shortage of talent in IT. And yet, readers write letters saying, I’m out there looking for work and I can’t find anything. What kind of a shortage are we talking about?

When I do media interviews, invariably I get e-mails and letters saying, What are you talking about? I have great experience and I can’t find a job.

[But] unfortunately, companies are looking at talent in a very different way. They are not geographically bound as much. There may be a great C+ programmer in Boston but somebody needs him in Madison, Wis., today.

The product lifecycle of an electronic device used to be three years. So, everything keyed off of that [and labor market cycles were longer]. The product lifecycle is now three months and labor has to key off of that [meaning there is going to be faster turnover in jobs]. And that creates a very discomfoting situation. And I don’t know how you reverse that. **CIO**

The Lowdown on IT Labor

To read more about **THE LABOR SHORTAGE PARADOX** discussed by Jeff Joerres, go to www.cio.com/071506 to download a Manpower research report. For more of Executive Editor Christopher Koch’s interview with Joerres, listen to the podcast at www.cio.com/podcasts.

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You can reach Executive Editor Christopher Koch at ckoch@cio.com.

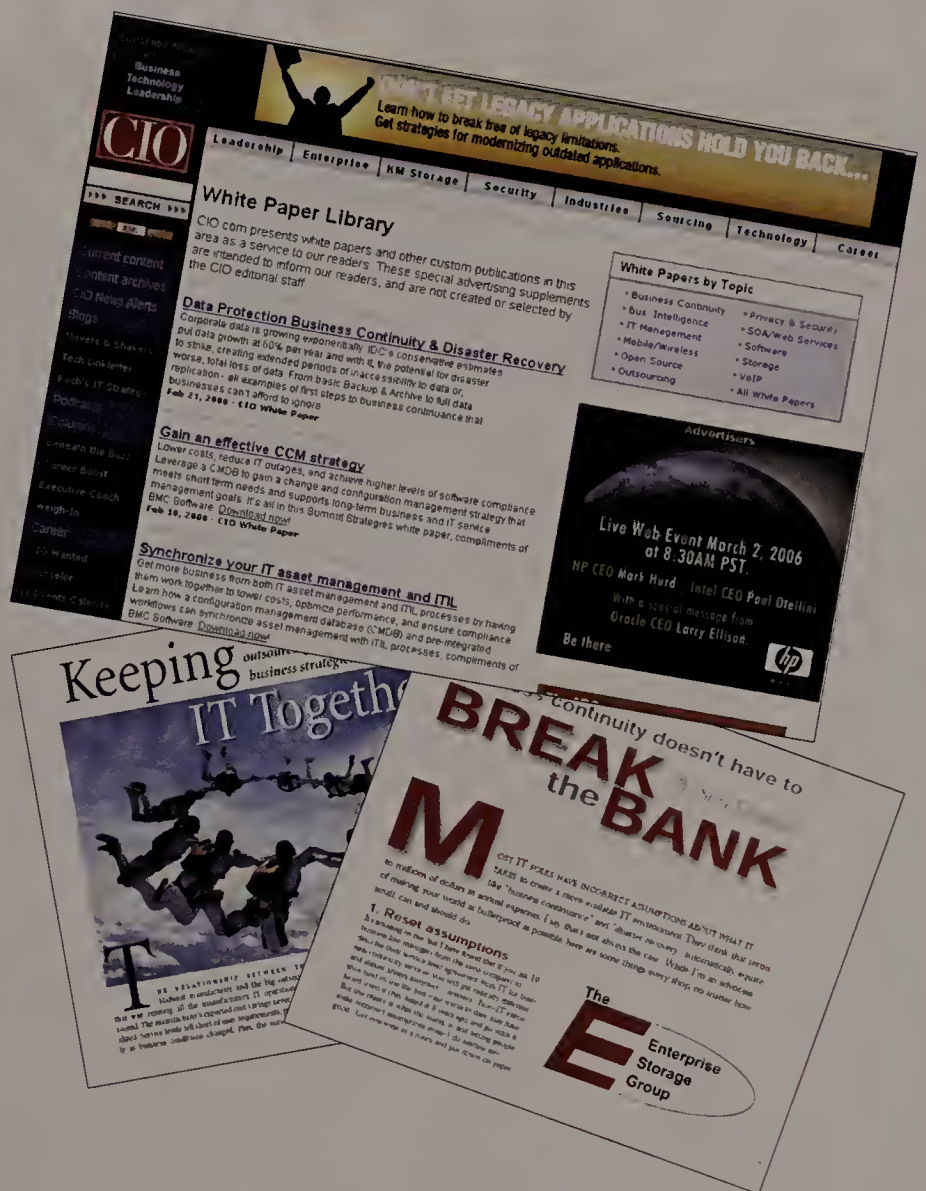
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Business
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GLOBAL OUTSOURCING GUIDE

In all the discussion about outsourcing, one simple fact sometimes gets lost:

Nobody beats the United States when it comes to people with IT skills. Taking into account the size and availability of the labor force, their education, relevant experience, language skills and turnover rates, A.T. Kearney ranked America tops in this area on its 2005 Global Services Location Index.

But labor arbitrage—cutting costs by exploiting the availability of lower-wage workers—remains the name of the game in IT sourcing. CIOs continue to seek savings through offshore outsourcing, and the Everest Research Institute predicts those savings will continue to drive sourcing offshore for the next 30 years. Today, 73 percent of Fortune 2000 companies say offshoring is an important part of their overall growth strategy, according to the 2005 Duke University CIBER/Archstone Consulting study. And Gartner predicts worldwide offshore spending will reach \$50 billion next year.

In this, CIO's third global outsourcing guide, we observe how the offshoring world has changed. (View previous guides at www.cio.com/archive/071504/guide.html.)

Risks, rewards, challenges and opportunities, country by country

BY STEPHANIE OVERBY

The Executive Summary

India remains the leading offshore destination by a wide margin, particularly for U.S. and U.K. companies. "Every year, the risks of moving work to India get lower," says Dean Davison, VP of strategic outsourcing for Nautilus Advisors. "India is increasingly more adept at IP protection, providing resilient infrastructure and managing global relationships effectively." Although Gartner estimates that India currently holds 80 percent to 90 percent of the offshoring market, wage inflation and the increasing maturity of other low-cost areas threaten its future dominance. And as India's star has risen, so have its turnover rates—a growing concern for CIOs. Consequently, Davison expects India's market share to shrink 20 percent by 2010.

Today, less than 10 percent of American companies outsource to more than one country but "most are evaluating multiple locations," says Davison. China, for example. Experts say it could be a powerful rival to India in the next three to five years, even though it currently can't match India's large English-speaking workforce, its level of compliance with international law or its number of IT grads.

Labor and operational costs in Central European countries such as Poland, Hungary and the Czech Republic—attractive outsourcing options for Western European businesses—continue to rise, approaching the level of their customers. So penny-pinching European CIOs are looking deeper into the former Soviet bloc, to countries like Romania, Bulgaria and the Ukraine. Latin American destinations such as Costa Rica, Mexico and Brazil are beginning to attract U.S. back-office and call center work as the need to service Spanish-speaking markets grows. And A.T. Kearney suggests that the Middle East and Africa may be the next frontier for offshore operations—if the politics of the area stabilize.

Although labor costs will continue to be the driving factor behind offshoring, CIOs must internalize the "cost-versus-risk equation," says Ian Marriott, research vice president at Gartner. When going offshore, common risks (infrastructure stability, process maturity, security) become more conspicuous, and uncommon risks (human resource predictability, political stability, rule of law or lack thereof) emerge. Increased competition for the offshore outsourcing dollar promises to raise standards around the globe, but more opportunity equals more risk, and choosing a location is an increasingly complex decision—one we're hoping the "2006 Global Outsourcing Guide" will help you make.

Our Ratings ★ ⚡ ✓ \$

Leading, Challenging, Emerging and Nascent labels are based on the maturity of the industry, the size of the market, the availability and cost of skilled labor, and the infrastructure (both government support and actual technology infrastructure). *Declining* ratings were given to countries where rising costs threaten the relevance of outsourcing for labor arbitrage reasons.

Relative geopolitical risk ratings, which include political, financial and economic risk, are based on 2006 data from The PRS Group, a business information provider; low, medium and high are qualified risk ratings accurate only in comparison to other countries in this guide, not globally.

Additional information was provided by the Everest Research Institute, A.T. Kearney's 2005 Global Services Location Index, Gartner, NeolT's "Mapping Offshore Markets Update 2005" and "Offshore and Nearshore Salary Report," Mercer's "2005 Global Pay Trends—IT Function Report," 2005 Duke University CIBER/Archstone Consulting Biannual Offshore Survey, Trestle Group's "Offshore Outsourcing Country Profiles," Datamonitor, websites of various countries' IT organizations and individual interviews.



ASIA

India

Leading ★★★★★

Average programmer salary: \$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓✓✓✓

Pros: Working to stay on top, challenging Western IT integrators and consultancies for business. Has essential resources and robust infrastructure to deliver comprehensive application, infrastructure and business process services. Rakes in almost \$18 billion in IT and BPO annually. TCS, HCL Technologies, Wipro, Satyam and Infosys have all topped the billion-dollar mark and are moving up the IT value chain. Home to some of the most technologically advanced companies in the world; three out of five of the world's CMM Level 5 companies are in India. 200,000 IT grads per year.

Cons: Turnover, turnover, turnover. Even India's National Association of Software and Services Companies says it's a big problem. Turnover rates of 10% to 12% in entry-level positions, 15% to 20% in middle management; you can lose 100% of a project team overnight. Wages also on the rise. On International Intellectual Property Alliance (IIPA) priority watch list.

China

Challenging ★★★★★

Average programmer salary: \$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓

Pros: Poised to take over India's top spot, growing at 25% a year since 1999.

Infrastructure improving. Shanghai and Beijing well-connected; second-tier cities catching up. Business transparency increasing. Estimated 2 million Chinese software programmers right now and still growing. Good location for servicing local operations of multinationals and Chinese companies. Low-cost alternative for neighboring Japan, Korea, Taiwan, Hong Kong and Singapore.

Cons: IT services companies small and inexperienced in global business and enterprise IT. Project managers and senior-level talent scarce. English skills minimal. Data and IP protection continues to be an issue. On IIPA priority watch list. Used mainly for low-end application development, maintenance, testing. Rising wages may dilute attractiveness.

Malaysia

Challenging ★★★★★

Average programmer salary: \$\$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓✓

Pros: Ranked third on A.T. Kearney's offshoring attractiveness list. Strong governmental support and continued investment in world-class infrastructure (Multimedia Super Corridor initiative). Programs and policies to expand the labor pool and deepen English language and technical skills. Could be a good second location for minimizing offshore risk.

Cons: Lacks critical mass to be a top IT services location. Low service maturity and small labor pool.

Philippines

Challenging ★★★★★

Average programmer salary: \$\$

Geopolitical risk: ⚡⚡⚡

English proficiency: ✓✓✓✓

Pros: Ranked fourth overall by A.T. Kearney, due largely to language skills (English with American accents), Western cultural literacy and exposure to global business. Tied with Ghana for the world's best financial incentives for attracting IT business. Bandwidth high compared to neighbors. Years of experience with standard BPO projects, earning country about \$1 billion annually.

Cons: Continued political instability and infrastructure weaknesses. Low IT process maturity. CMM, Six Sigma and other process certifications not followed until recently. On IIPA priority watch list.

Vietnam

Nascent ★★

Average programmer salary: \$

Geopolitical risk: ⚡⚡

English proficiency: ✓✓

Pros: Cheap; lowest wages in the outsourcing world. Major contracts with Western telecom providers like Nortel Networks and completion of tech park in Ho Chi Minh City promising. English now standard curriculum. IT sector growing 20% annually. Low attrition rates. Could step in as a low-end provider for basic IT projects as India moves up the value chain.

Cons: High risk of IP loss and infrastructure outages. Entire country operates on 60MB



EUROPE

Ireland

Declining ★

Average programmer salary: \$\$\$\$\$\$

Geopolitical risk: ⚡

English proficiency: ✓✓✓✓✓

Pros: Mature market for offshore contact center services. Excellent infrastructure. Obvious cultural compatibility. Political stability and data and IP security big pluses.

Cons: Too expensive; no longer viable center for labor arbitrage. Gap between labor supply and demand a burgeoning problem.

Hungary

Challenging ★★★★★

Average programmer salary: \$\$\$

Geopolitical risk: ⚡

English proficiency: ✓

Pros: EU member boasts low costs and good cultural compatibility with Western Europe. Establishing itself as data center home for businesses in nearby European countries.

Cons: Wages and other costs on uptick. Poor English skills and infrastructure.

Romania

Emerging ★★★

Average programmer salary: \$\$

Geopolitical risk: ⚡

English proficiency: ✓✓✓

Pros: Attractive destination for Europe—particularly Italy—because of proximity and well-developed English and Western European language skills. Romanian IT professionals consistently place in top

of bandwidth. Inadequate non-IT infrastructure (roads, power grid, airports, real estate development). Most companies can offer only small-scale back-office functions. Low number of English speakers and senior IT managers.

Thailand

Nascent ★★

Average programmer salary: \$\$

Geopolitical risk: ⚡

English proficiency: ✓

Pros: Biggest jumper in the A.T. Kearney offshore index, thanks to improvements in education, infrastructure and overall business environment. Look out, Philippines—could emerge as a low-cost challenger.

Cons: Weak English-language capabilities. On IIPA priority watch list.

Singapore

Declining ★

Average programmer salary: \$\$\$\$

Geopolitical risk: ⚡

English proficiency: ✓✓

Pros: Positions itself as stable location for sensitive, high-end activities, with emphasis on business continuity/disaster recovery, IP protection and data privacy. Ranked fifth on A.T. Kearney's offshoring attractiveness list. Topped business environment category. When Kearney rejiggered its index to give risk minimization more weight, Singapore came out on top.

Cons: So expensive that Singapore outsources to China.

Overall Ranking

★★★★★ Leading
★★★★ Challenging
★★★ Emerging
★★ Nascent
★ Declining

English Proficiency

✓✓✓✓ Excellent
✓✓✓ Very good
✓✓ Good
✓ Fair
✓ Poor

Average Entry-Level Programmer Salary US\$ (2 years' experience)

\$ less than \$5K
\$\$ \$5K-\$10K
\$\$\$ \$10K-\$15K
\$\$\$\$ \$15K-\$20K
\$\$\$\$\$ More than \$20K

Relative Geopolitical Risk

⚡ Low
⚡⚡ Moderate
⚡⚡⚡ High

rank at global programming competitions. Most IT professionals per capita in Europe, according to Brainbench. Can provide multilingual call centers, with particular specialty in French and Italian.

Cons: Weak IT infrastructure (may improve as country attempts to join EU next year). Most companies are small—15 to 20 people. IP protection a problem, although piracy rate has decreased recently.

Bulgaria

Emerging ★★★

Average programmer salary: \$\$

Geopolitical risk: ⚡

English proficiency: ✓✓

Pros: Historical high-tech center of former Soviet Union. Good for high-end, complex but small-scale projects. Renovating Soviet-era telecom and IT infrastructure preparing for possible EU membership in 2007. Experienced service providers (as many as a thousand Western companies were doing IT work in Bulgaria as far back as the 1990s). Excellent math, science and engineering schools. IT workers experienced in complex technologies.

Cons: Small workforce; only 800 Bulgarians graduate with technical degrees each year. IT spending ranks one of the lowest in the Central and Eastern Europe. Can't compete on price or scale with India or China.



Czech Republic

Challenging ★★★★★

Average programmer salary: \$\$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓✓✓

Pros: Low costs, political stability and cultural compatibility. Emerged as ideal location for German customer service needs.

Cons: Salaries and other costs on the rise. Little government support for IT services industry. IT process maturity low.

Poland

Challenging ★★★★★

Average programmer salary: \$\$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓✓✓

Pros: EU member state a favorite location for German companies (nearly 400,000 German speakers here). Offers cultural and time zone compatibility for much of Western Europe. Good base of English speakers.

Cons: Lack of service maturity and relatively small labor pool. Wages and costs rising.

Ukraine

Emerging ★★★

Average programmer salary: \$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓

Pros: IT industry benefited from 2004 political upheaval. IT services sector grew 50% to \$150 million in 2005. Highly educated IT staffs may be able to handle entire development process. Low turnover.

Cons: English not widespread. Political stability questionable. Small talent pool. On IIPA priority watch list.

Russia

Challenging ★★★★★

Average programmer salary: \$\$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓

Pros: Highly skilled labor pool offering boutique approach to outsourcing. Specializes in complex modeling and creative problem solving. Hourly rates as low as India.

Cons: Ranked 39th out of 40 on business environment metrics, according to A.T. Kearney. Costs rising. Poor infrastructure and security. English and Western European language proficiency lacking. Project management skills low. World's worst for piracy, according to IIPA.

MIDDLE EAST

Israel

Declining ★

Average programmer salary: \$\$\$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓✓✓✓

Pros: Promotes itself as ideal location for high-end research and development work. Multilingual customer support. Strong education system and diverse population.

Cons: Politically unstable and expensive. On IIPA priority watch list.

Egypt

Emerging ★★★

Average programmer salary: \$

Geopolitical risk: ⚡⚡⚡

English proficiency: ✓✓✓✓

Pros: Ranks 12th in A.T. Kearney's attractiveness index with highly educated tech workers, historical exposure to Western languages and low costs. Trying to be "gateway" from West to Middle East. Increasing customer service standards. Investing heavily in IT infrastructure. Datamonitor predicts Egypt will experience most aggressive offshore outsourcing growth in the world through the next decade.

Cons: Security and political stability concerns. On IIPA priority watch list.

AFRICA

Ghana

Nascent ★★

Average programmer salary: \$\$

Geopolitical risk: ⚡⚡⚡

English proficiency: ✓✓✓✓

Pros: Government supporting IT services industry and investment programs enticed Allied Computer Services to establish BPO operation here. English is official language. Low turnover rate (2% to 4%). Labor cheap and available. Tied with Philippines for world's best financial incentives for attracting IT business, according to A.T. Kearney.

Cons: Local BPO service providers lack experience. IT services market very small. Just 10,000 IT grads per year.



South Africa

Challenging ★★★★★

Average programmer salary: \$\$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓✓✓✓

Pros: Has attracted high-profile clients for call center outsourcing. Good English proficiency. Time zone compatibility and cultural affinity with Western Europe.

Cons: High costs (particularly telecom) and low process maturity relative to other offshore destinations. High crime rate.

THE AMERICAS

Canada

Declining ★

Average programmer salary: \$\$\$\$\$

Geopolitical risk: ⚡

English proficiency: ✓✓✓✓✓

Pros: Second largest outsourcing market in the world (after India), earning nearly \$13.7 billion in IT and BPO. Capability for complex integration technology and services. Fifth in people and skills availability, according to A.T. Kearney. Attractive nearshoring option for U.S., with high-quality service, low risks. Low turnover. Ideal spot for English-speaking call centers.

Cons: Shift in exchange rates undid much of previous advantage in labor arbitrage, property overheads. Some U.S. cities now cheaper. May continue to lose attractiveness as services offered by lower-cost countries mature.

Mexico

Challenging ★★★★★

Average programmer salary: \$\$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓

Pros: Second largest IT services market in Latin America and still growing. Increasingly attractive as a call center platform for serving Spanish-speaking populations. Call center positions expected to grow from 33,500 today to 80,000 by 2010, according to Data-monitor. Weakness of peso against dollar provides additional savings. IBM, Accenture and EDS maintain significant presence.

Cons: Poor English skills and IT process discipline. Rising costs. Best for low-level application development and maintenance services requiring minimal interaction.

Costa Rica

Emerging ★★★

Average programmer salary: \$\$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓✓✓✓

Pros: Now exporting more software than bananas thanks to low costs, a bilingual workforce and political stability. Becoming a hub for call center and back-office outsourcing. Literacy rate 95%.

Cons: Small labor pool. Government-owned telecom monopoly hampers IT industry growth. Showed improvement in A.T. Kearney's offshoring attractiveness index in 2005, but still ranks below 19 other countries. Tax-free offers to foreign companies ruled illegal by WTO and must be phased out by 2009.

Overall Ranking

★★★★★ Leading
★★★★ Challenging
★★★ Emerging
★★ Nascent
★ Declining

English Proficiency

✓✓✓✓ Excellent
✓✓✓ Very good
✓✓ Good
✓ Fair
✓ Poor

Average Entry-Level Programmer Salary US \$ (2 years' experience)

\$ less than \$5K
\$\$ \$5K-\$10K
\$\$\$ \$10K-\$15K
\$\$\$\$ \$15K-\$20K
\$\$\$\$\$ More than \$20K

Relative Geopolitical Risk

⚡ Low
⚡⚡ Moderate
⚡⚡⚡ High

Brazil

Emerging ★★★

Average programmer salary: \$\$

Geopolitical risk: ⚡⚡⚡

English proficiency: ✓

Pros: Latin American leader in IT services market. Leading-edge infrastructure (spends more on technology per GDP than India or China). Graduates 15,000 IT professionals annually; certification rates on the rise. Possible nearshore alternative for North American countries and good possibility for Spanish and Portuguese language projects.

Cons: Business-unfriendly labor and trade laws. Poor English. Globally unsophisticated.

Argentina

Nascent ★★

Average programmer salary: \$\$

Geopolitical risk: ⚡⚡

English proficiency: ✓✓

Pros: Skilled workforce and good IT and telecom infrastructure. Favorable time zone for North American work. Leader in Spanish-content software products. Low costs a result of peso devaluation in 2002.

Cons: IT sector small. Ranked 23rd in offshore attractiveness by A.T. Kearney. Government not investing in IT services sector. Process maturity low. **CIO**

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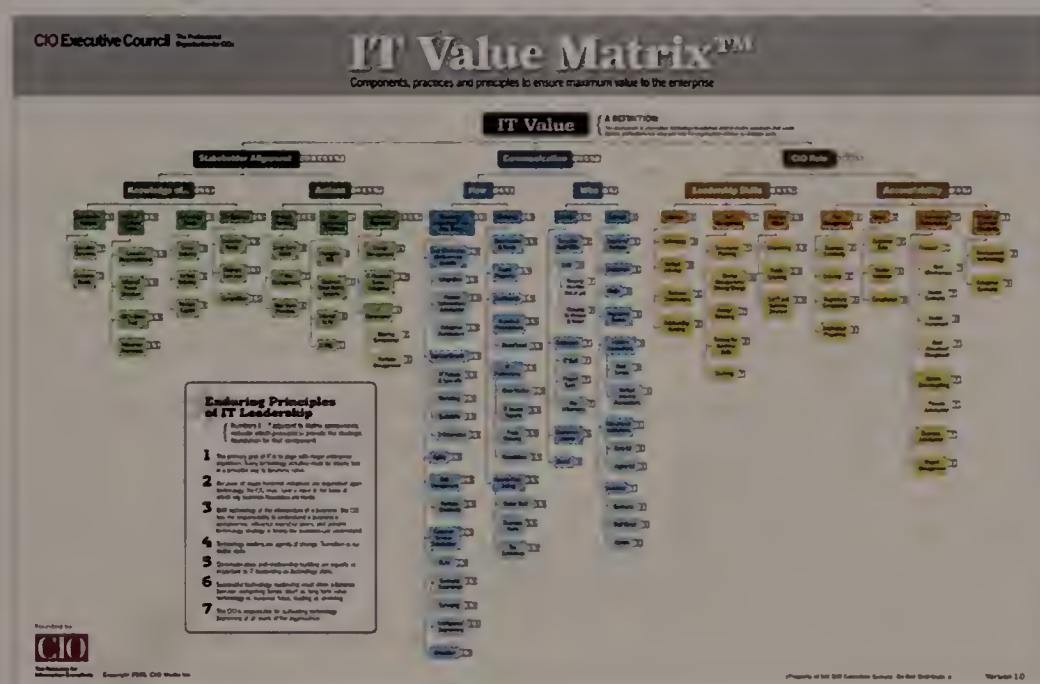
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How do *you* maximize the value of IT?

IT is still one of the most misunderstood functions in business.

The CIO Executive Council, a professional community developed by CIOs, has focused its members' collective effort on this challenge. Their initiative has resulted in groundbreaking tools—the IT Value Matrix and Knowledge Center™—to help leverage the value of IT throughout the organization.

The IT Value Matrix illustrates the principles and practices essential to creating, identifying and communicating IT's value to the enterprise. Its online Knowledge Center provides best practices contributed by Council members, supplemented by case studies and how-to articles from *CIO* magazine that are grouped in categories that correspond to all the components of the Matrix.



Visit www.cioexecutivecouncil.com/it_value to get your own copy of the Matrix and to watch the IT Value webcast, presented by Agrilience CIO and Council member Steven John.

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The Professional Organization for CIOs

The CIO Executive Council was created by readers of *CIO* magazine and leaders within the community of CIOs to leverage the individual and collective strengths of its members by serving as unbiased and trusted advisors to each other, and by advancing the CIO role and profession. In just two years, more than 300 CIOs worldwide from various sectors and industries have identified with the Council's vision and committed to assist each other, cultivate their own careers and those of their team, and advance the role of the CIO. **To inquire about membership, visit www.cioexecutivecouncil.com.**

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Business
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Sometimes the press release tells only part of the story

Our market has been shrinking, and both companies have been sucking wind.



PRESS RELEASE

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The investment bankers said it was a good idea, and the bonus I'm getting will enable me to re-gild the plumbing fixtures on my yacht.

July 10—InstantROI Software and ROIToday are joining forces to create InstantROI Today, now the number-one player in the return on investment software sector.

"Before, we could only promise our customers instant ROI," said John R. MacDonald, chairman and CEO of InstantROI Software. "But with this powerful combination of our two companies, we can now guarantee a positive return on investment a full three months before a prospective customer picks up the phone to call us."

"We've always admired the way Jack MacDonald and his company have done business," said Eric Waldon, founder and CEO of ROIToday.

The deal is a true merger of equals. Mr. MacDonald will retain the title of chairman and CEO. Mr. Waldon's new title will be "Chief Strategy Officer," and his responsibility primarily will consist of strategizing.

The rest of the ROIToday management team is leaving to spend more time with their families and pursue other interests.

The new company pledges to continue to support the full product lines of InstantROI and ROIToday.

Along with combining names, the two companies have agreed to combine their respective slogans: "24/7 Support Til the End of Time" and "When Any Little Thing Goes Wrong, ROIToday Is There for You."

ROIToday shareholders will receive 0.000004 shares of InstantROI Today for each share that they own, plus three large boxes of InstantROI key chains from last fall's ROI Now trade show.

"We're excited to begin enjoying the myriad synergies that this combination will create," said MacDonald.

Integration of the two firms is expected to be complete by the end of the year.

By then, everyone should have received their new business cards. As for our information systems, who knows?

I should've paid more attention in my negotiation class at Wharton.

New slogan: "24/7 Support Until Anything Goes Wrong."

If the analysts pan this deal, we're all goners.

We asked them to clear out their offices by the end of the day. A comprehensive inventory of the supply closets has already been instituted.

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Ultimately, a well-managed IT environment gives you the visibility and control you need to manage risk, manage costs, improve service and align IT investments. To learn more about how CA and our wide array of partners can help you unify and simplify your IT management, visit ca.com/unify.